ThinkServer TD100 and TD100x
Types 4203, 4204, 4205, 4206, 6398, 6399, 6419, and 6429

lenovo

User Guide

ThinkServer TD100 and TD100x
Types 4203, 4204, 4205, 4206, 6398, 6399, 6419, and 6429

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User Guide

Note:

Before using this information and the product it supports, read the general information in “Notices,” on page 69, and the *Warranty and Support Information* document on the *ThinkServer Documentation* DVD.

Third Edition (April 2009)

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information (安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

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Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled “Statement 1,” translations for that caution statement are in the *Safety Information* document under “Statement 1.”

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with any optional device before you install the device.

Statement 1:

DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	**To Disconnect:**
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 2:

CAUTION:
When replacing the lithium battery, use only the battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

Statement 3:

CAUTION:
When laser products (such as CD drives, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 4:

≥ 18 kg (39.7 lb)

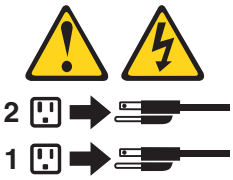
≥ 32 kg (70.5 lb)

≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 12:

CAUTION:
The following label indicates a hot surface nearby.

Statement 13:

DANGER

Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.

Statement 15:

CAUTION:
Make sure that the rack is secured properly to avoid tipping when the server unit is extended.

Chapter 1. The ThinkServer TD100 and TD100x server

The Lenovo® ThinkServer™ TD100 and TD100x (Machine Types 4203, 4204, 4205, 4206, 6398, 6399, 6419, and 6429) is a 5-U-high, high-performance server. It is ideally suited for networking environments that require superior microprocessor performance, improved systems management, and flexible memory and data management.

The server comes with a limited warranty. For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document.

You can obtain up-to-date information about the server and other Lenovo server products at: http://www.lenovo.com/thinkserver.

Related documentation

This *User Guide* provides general information about the server, including how to install supported options and how to configure the server. The following documentation also comes with the server:

- *Installation Guide*
  This document is in Portable Document Format (PDF) on the *ThinkServer Documentation* DVD. It provides information about setting up the server and basic instructions for installing some optional devices.
- *Warranty and Support Information*

  This document is in PDF on the *ThinkServer Documentation* DVD. It contains information about the terms of the warranty and getting service and assistance.
- *Safety Information*
  This document is in PDF on the *ThinkServer Documentation* DVD. It contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.
- *Hardware Maintenance Manual*
  This document is available in English in PDF on the *ThinkServer Documentation* DVD. It contains information to help you solve problems yourself, and it contains information for service technicians. The most current version of the *Hardware Maintenance Manual* is available on the Lenovo Support Web site.

Depending on the server model, additional documentation might be included on the *ThinkServer Documentation* DVD.

The server might have features that are not described in the documentation that comes with the server. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the server documentation. These updates are available from the Lenovo Web site. To check for updated documentation and technical updates, complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Racks are measured in vertical increments of 4.45 cm (1.75 inches) each. Each increment is called a ″U.″ A 1-U-high device is 1.75 inches tall.

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1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TD100 and TD100x**, and click **Continue**.

Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the *ThinkServer Documentation* DVD. Each statement is numbered for reference so you can locate the corresponding statement in your language in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

ThinkServer TD100 features and specifications (Machine Types 6398, 6399, 6419, 6429)

The following information is a summary of the features and specifications for Machine Types 6398, 6399, 6419, 6429. Depending on the server model, some features might not be available, or some specifications might not apply.

Table 1. Features and specifications

Microprocessors:
- Supports up to two Intel® Xeon® dual-core processors
- 4 MB shared Level-2 cache
- 667, 1066, or 1333 MHz front-side bus (FSB)

Note: Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors.

Memory:
- Minimum: 1 GB
- Maximum: 32 GB (16 GB in mirrored mode)
- Type: PC2-5300, ECC fully-buffered with double-data-rate 2 (DDR2) SDRAM
- Connectors: eight dual inline memory module (DIMM) connectors, two-way interleaved

Drives (depending on the model):
- Diskette (optional): External USB diskette drive
- Hard disk drive: SATA
- One of the following IDE drives:
  - CD-ROM
  - CD-RW (optional)
  - DVD-ROM (optional)
  - DVD-ROM/CD-RW (optional)

Expansion bays (depending on the model):
- Three half-high 5.25-in. bays (one CD or DVD drive installed) or one half-high CD or DVD drive and one full-high tape drive
- Four 3.5-in. simple-swap bays

PCI expansion slots (depending on the model):
- Six PCI expansion slots
  - Three PCI Express x8 slots (two x8 links and one x4 link)
  - One PCI 32-bit/33 MHz slot
  - Two PCI-X 64-bit/133 MHz slots

Fans:
Three speed-controlled hot-swap fans

Power supply:
670 watt (90-240 V ac)

Size:
- Height: 440 mm (17.3 in.)
- Depth: 747 mm (29.4 in.)
- Width: 218 mm (8.6 in.)
- Weight: 20 kg (42 lb) to 34 kg (75 lb) depending upon configuration

Integrated functions:
- Baseboard management controller (BMC) or onboard service processor
- Broadcom 5721 10/100/1000 Ethernet controller on the system board with RJ-45 Ethernet port
- Six-port, Serial ATA controller
- Integrated RAID capability (HostRAID)
- Two serial ports
- One parallel port
- Four Universal Serial Bus (USB) v2.0 ports (two on front and two on rear)
- Keyboard port
- Mouse port
- ATA-100 single-channel IDE controller (bus mastering)
- ATI ES1000 video controller
  - Compatible with SVGA and VGA
  - 16 MB SDRAM video memory

Diagnostic LEDs:
- Fans
- Memory
- Power supply

Acoustical noise emissions:
- Sound power, idling: 5.6 bel
- Sound power, operating: 6.0 bel

Environment:
- Air temperature:
  - Server on: 10° to 35°C (50° to 95°F) Altitude: 0 to 914 m (2998.0 ft)
  - Server off: -40° to 60°C (-40° to 140°F) Altitude: 0 to 2133 m (7000.0 ft)
- Humidity (operating and storage): 8% to 80%

Heat output:
Approximate heat output in British thermal units (Btu) per hour:
- Minimum configuration: 693 Btu per hour (203 watts)
- Maximum configuration: 1631 Btu per hour (478 watts)

Electrical input:
- Sine-wave input (50 or 60 Hz) required
- Input voltage and frequency ranges automatically selected
- Input voltage low range:
  - Minimum: 100 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Input kilovolt-amperes (kVA) approximately:
  - Minimum: 0.21 kVA (all models)
  - Maximum: 0.49 kVA

Notes:

1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.
2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.

ThinkServer TD100x features and specifications (Machine Types 4203, 4204, 4205, 4206)

The following information is a summary of the features and specifications of the server. Depending on the server model, some features might not be available, or some specifications might not apply.

Table 2. Features and specifications

Microprocessor:
- Intel Xeon™ dual-core or quad-core with 12 MB Level-2 cache
  Important: Do not use dual-core and quad-core processors in the same server.
- Support for up to two microprocessors
- Support for Intel Extended Memory 64 Technology (EM64T)

Note: Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors.

Memory:
- Minimum: 1 GB depending on server model, expandable to 48 GB
- Type: 667 MHz, PC2-5300, ECC Fully Buffered DIMMs (FBD) with double data rate (DDR) II, SDRAM
- Connectors: Twelve 240-pin dual inline memory module (DIMM) connectors

Drives:
- IDE:
  - DVD (standard)
  - CD, CD-RW, DVD/CD-RW (optional)
  - Maximum of two devices can be installed
- Diskette (optional): External USB 1.44 MB
- Supported hard disk drives:
  - Serial Attached SCSI (SAS)
  - Serial Advanced Technology Attachment (SATA)

Expansion bays:
- Eight hot-swap SAS, 3.5-inch bays or 12 hot-swap SAS, 2.5-inch bays
- Three half-high 5.25-inch bays (DVD drive installed)
  Note: Full-high devices such as an optional tape drive will occupy two half-high 5.25-inch bays.

PCI and PCI-X expansion slots:
- Six PCI expansion slots
  - Three PCI Express x8 (two x8 links and one x4 link) slots
  - One PCI 33 MHz/32-bit slot
  - Two PCI-X 2.0 133 MHz/64-bit slots

Upgradeable microcode:
System BIOS, service microprocessor, BMC, and SAS microcode

Power supply:
Note: To upgrade to two 835-watt hot-swap power supplies, install the redundant power and cooling option kit. Kit includes one 835-watt power-supply and three hot-swap fans.
- Standard: One 835-watt 110 V or 240 V ac input dual-rated power supply
- Upgradeable to two 835-watt hot-swap power supplies

Hot-swap fans:
- Three (standard)
- Upgradeable to six fans (for redundant cooling)

Note: To upgrade to redundant cooling, install the redundant power and cooling option kit. Kit includes one 835-watt hot-swap power-supply and three hot-swap fans.

Size:
- Tower
  - Height: 440 mm (17.3 in.)
  - Depth: 747 mm (29.4 in.)
  - Width: 218 mm (8.6 in.)
  - Weight: approximately 38 kg (84 lb) when fully configured or 20 kg (42 lb) minimum
- Rack
  - 5 U
  - Height: 218 mm (8.6 in.)
  - Depth: 696 mm (27.4 in.)
  - Width: 424 mm (16.7 in.)
  - Weight: approximately 34 kg (75 lb) when fully configured or 20 kg (42 lb) minimum

Racks are marked in vertical increments of 4.45 cm (1.75 inches). Each increment is referred to as a unit, or "U." A 1-U-high device is 4.45 cm (1.75 inches) tall.

Integrated functions:
- Baseboard management controller (Intelligent Platform Management Interface (IPMI) 2.0 compliant)
- Easy LED diagnostics
- ServeRAID-8k (512 MB with battery backup) and ServeRAID-8s SAS Controllers support RAID levels 0, 1, 1E, ,10, 5, 6, 50, and 60
  Note: The server will not start without a RAID controller installed.
  - Eight 3.5–inch hard disk drive models: ServeRAID-8k-l or ServeRAID-8k
  - Twelve 2.5-inch hard disk drive models: ServeRAID-8k and ServeRAID-8s
- Four Universal Serial Bus (USB) ports (2.0)
  - Two on rear of server
  - Two on front of server
- Broadcom 5721 and 5721KFB3 10/100/1000 Gigabit Ethernet controllers
- ATI PCI ES1000 video
  - 16 MB video memory
  - VGA and SVGA compatible
- ATA-100 single-channel IDE controller (bus mastering)
- Vitesse VSC7250 SAS/SATA RAID controller
- Mouse connector
- Keyboard connector
- Serial connector

Acoustical noise emissions:
- Sound power, idle: 5.5 bel declared
- Sound power, operating: 6.0 bel declared

Environment:
- Air temperature:
  - Server on: 10° to 35°C (50.0° to 95.0°F); altitude: 0 to 2134 m (7000 ft)
  - Server off: -40° to 60°C (-40.0° to 140.4°F); maximum altitude: 2134 m (7000 ft)
- Humidity:
  - Server on: 8% to 80%
  - Server off: 8% to 80%

Heat output:

Approximate heat output in British thermal units (Btu) per hour:
- Minimum configuration: 2013 Btu per hour (590 watts)
- Maximum configuration: 2951 Btu per hour (865 watts)

Electrical input:
- Sine-wave input (50-60 Hz) required
- Input voltage low range:
  - Minimum: 100 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Approximate input kilovolt-amperes (kVA):
  - Minimum: 0.60 kVA
  - Maximum: 0.88 kVA

Notes:

1. Power consumption and heat output vary depending on the number and type of optional features that are installed and the power-management optional features that are in use.
2. These levels were measured in controlled acoustical environments according to the procedures that are specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average stated values because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.

What your server offers

The server uses the following features and technologies:

- **Baseboard management controller (BMC)**

  The BMC provides basic service-processor environmental monitoring functions. If an environmental condition exceeds a threshold or if a system component fails, the BMC provides LEDs to help you diagnose the problem.

- **High-performance graphics controller**

  The server comes with an onboard high-performance graphics controller that supports high resolutions and includes many performance-enhancing features for the operating-system environment.

- **Diagnostics CD**

  The *Diagnostics* CD provided with your server contains the diagnostic programs for testing the major components of the server. For additional information about the *Diagnostics* CD , see the *Hardware Maintenance Manual*, which is available on the Lenovo Support Web site.

  Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

  1. Go to: http://www.lenovo.com/support.
  2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
  3. From **Family** list, select **ThinkServer TD100 and TD100x**, and click **Continue**.
  4. Click **Downloads and drivers** to download firmware updates.

- **EasyManage software**

  ThinkServer EasyManage software helps you maintain high performance while limiting downtime. Through a single console you can monitor and configure alerts for security and performance, perform hardware failure prediction, deploy operating systems and software, and monitor software licenses. You can download and install the EasyManage software from the Lenovo Support Web site (http://www.lenovo.com/support).

- **ThinkServer EasyStartup DVD**

  The Lenovo *ThinkServer EasyStartup* DVD that comes with the server provides programs to help you set up the server and install an operating system. The EasyStartup program detects installed hardware devices and guides you through the process of creating a response file and performing an unattended installation of the operating system and associated device drivers.

- **Integrated network support**

  The server comes with an integrated Broadcom NetXtreme Gigabit Ethernet controller, which supports connection to a 10-Mbps, 100-Mbps, or 1000-Mbps network. For more information, see “Configuring the Broadcom NetXtreme Gigabit Ethernet controller” on page 66.

- **Large data-storage capacity and hot-swap capabilities**

  Hot-swap models support up to eight slim-high, 3.5-inch hot-swap hard disk drives in the hot-swap bays. With the hot-swap feature, you can add, remove, or replace hard disk drives without turning off the server.

- **Large system-memory capacity**

  TD100

  The server supports up to 32 GB (reduced to 16 GB in mirrored mode) of system memory . The memory controller supports error correcting code (ECC) for up to

eight industry-standard, 2-way interleaved, x4 or x8, 1.8 V, 240-pin, double-data-rate 2 (DDR2), PC2-5300, 677 MHz, dynamic random-access memory (DRAM) fully buffered (FBD) dual inline memory modules (DIMMs).

TD100x

The server supports up to 48 GB (reduced to 24 GB in mirrored mode) of system memory. The memory controller supports error correcting code (ECC) for up to 12 240-pin, DDR1, PC2-5300, SDRAM, 667 MHz, fully buffered DIMMs.

- **Memory mirroring**

  Some models support memory mirroring. Memory mirroring replicates and stores data in DIMMs within two branches simultaneously. To support memory mirroring, you must have at least two pairs of DIMMs installed (a pair in each branch). Pairs of DIMMs that are next to each other (for example, DIMM slot 1 and DIMM slot 4) within the channels of the same branch must be identical pairs of full-buffered, dual inline memory modules (DIMMs). For more information, see “Installing a memory module” on page 28.

- **Online-spare memory**

  Some models support online-sparing memory. Online-spare memory disables a failed rank pair of DIMMs from the system configuration and activates an online-spare rank pair of DIMMs to replace the failed rank pair of DIMMs. For an online-spare pair of DIMMs to be activated, you must enable this feature and have installed an additional pair of DIMMs of the same speed, type, size (or larger), and technology as the failed pair of DIMMs. For more information, see “Installing a memory module” on page 28.

- **Redundant power capabilities**

  Some models support up to two 835-watt power supplies, which provide redundancy and hot-swap capability for a typical configuration. If the maximum load on the server is less than 835 watts and a problem occurs with one of the power supplies, the other power supply can meet the power requirements.

- **ServeRAID™ support**

  Some models support ServeRAID adapters to create redundant array of independent disks (RAID) configurations. Some models also have integrated RAID level-0 and level-1 support.

- **Symmetric multiprocessing (SMP)**

  The server supports up to two Intel Xeon microprocessors. Each microprocessor provides symmetric multiprocessing capability. When you install the second microprocessor, this will enhance the performance of the server.

- **Systems-management capabilities**

  The server supports an optional Remote Supervisor Adapter II SlimLine, which provides service-processor functions in addition to those that the BMC provides. When this adapter is used with the systems-management software that comes with the server, you can manage the functions of the server locally and remotely. The Remote Supervisor Adapter II SlimLine also provides system monitoring, event recording, and dial-out alert capability.

  See the documentation that comes with your systems-management software for more information.

Reliability, availability, and serviceability

Three important server design features are reliability, availability, and serviceability (RAS). The RAS features help to ensure the integrity of the data that is stored in the server, the availability of the server when you need it, and the ease with which you can diagnose and repair problems.

The server might have the following RAS features (the features vary depending on your model):

- Advanced Configuration and Power Interface (ACPI)
- Advanced Desktop Management Interface (DMI) features
- Automatic error retry or recovery
- Automatic memory downsizing on error detection
- Automatic restart on nonmaskable interrupt (NMI)
- Automatic Server Restart (ASR) logic supporting a system restart when the operating system becomes unresponsive
- Automatic server restart after a power failure, based on the BIOS setting
- Availability of microcode level
- Boot-block recovery
- Built-in, menu-driven setup, system configuration, and redundant array of independent disks (RAID) configuration
- Built-in monitoring for fan, power, temperature, and voltage
- CD-based diagnostic programs
- Cooling fans with speed-sensing capability
- Customer support center that is available 24 hours a day, 7 days a week[2]
- Error codes and messages
- Error correcting code (ECC) double-data-rate 2 (DDR2) synchronous dynamic random-access memory (SDRAM) with serial presence detect (SPD)
- Error logging of POST failures
- Hot-swap Serial Attached SCSI (SAS) and hot-swap Serial ATA (SATA) hard disk drives
- Integrated Ethernet controller
- Support for an optional IBM Remote Supervisor Adapter II SlimLine
- Key-lock support for physical security
- Memory change messages posted to the error log
- Baseboard management controller (BMC) or service processor
- Power management
- Power-on self-test (POST)
- Read-only memory (ROM) checksums
- Redundant Ethernet capabilities (requires an optional Ethernet adapter) with failover support
- Simple-swap Serial Advanced Technology Attachment (SATA) hard disk drives
- Standby voltage for system-management features and monitoring
- System auto-configuring from the configuration menu
- System-error LED on the front bezel and diagnostic LEDs on the system board
- Upgradeable baseboard management controller (BMC) firmware
- Upgradeable microcode for POST, basic input/output system (BIOS) code, and read-only memory (ROM) resident code, locally or over a LAN
- Vital product data (VPD); includes serial-number information and replacement part numbers, stored in nonvolatile memory, for easier remote maintenance

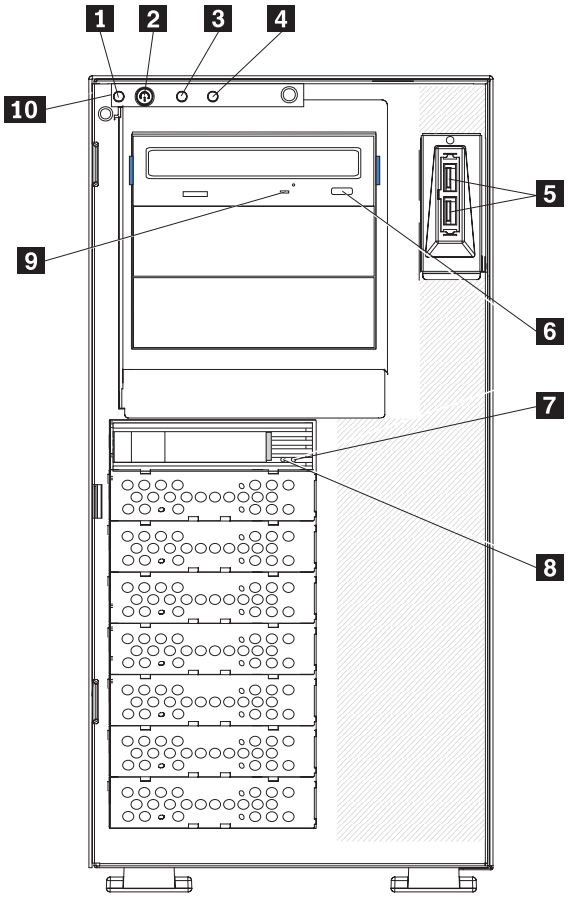
2. Service availability will vary by country. Response time varies; may exclude holidays.

Server controls, LEDs, and power

This section describes the controls and light-emitting diodes (LEDs) and how to turn the server on and off.

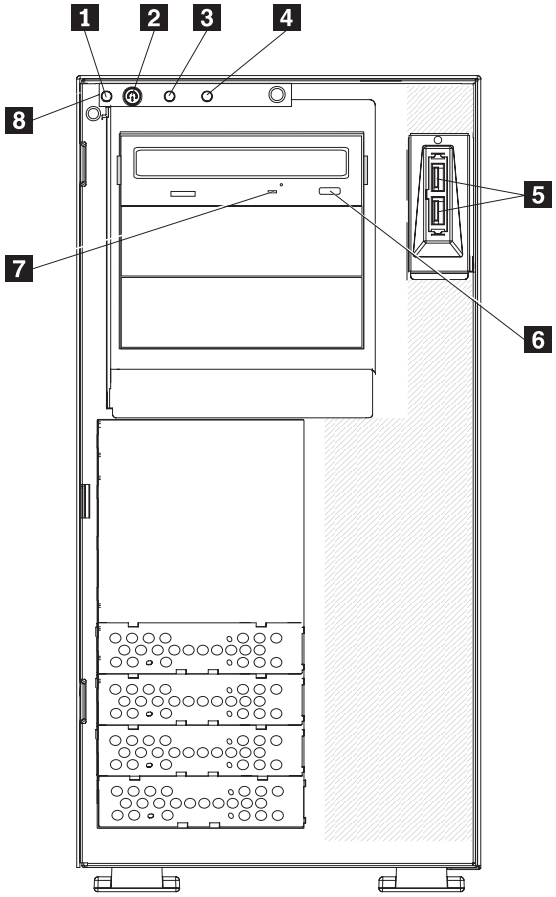
Front view

The following illustration shows the controls, LEDs, and connectors on the front of the hot-swap server models.



1	System power LED	6	CD-eject or DVD-eject button
2	Power-control button	7	Hot-swap hard disk drive status LED (amber)
3	Hard disk drive activity LED	8	Hot-swap hard disk drive activity LED (green)
4	System-error LED	9	CD or DVD drive activity LED (green)
5	USB connectors	10	Front information panel

The following illustration shows the controls, LEDs, and connectors on the front of the simple-swap server models.



1	System power LED	5	USB connectors
2	Power-control button	6	CD-eject or DVD-eject button
3	Hard disk drive activity LED	7	CD or DVD drive activity LED (green)
4	System-error LED	8	Front information panel

Power-on LED

When this LED is lit, it indicates that the server is turned on. When this LED is flashing, it indicates that the system is turned off but still connected to ac power. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed.

Power-control button

Press this button to turn the server on and off manually.

Hard disk drive activity LED

When this LED is flashing rapidly, it indicates that a hard disk drive is in use.

System-error LED

When this amber LED is lit, it indicates that a system error has occurred. An LED on the system board might also be lit to help isolate the error. Detailed troubleshooting information is in the *Hardware Maintenance Manual* on the *ThinkServer Documentation* DVD.

USB connectors

Connect USB devices to these connectors.

CD-eject or DVD-eject button

Press this button to release a CD from the CD drive or a DVD from the DVD drive.

CD or DVD drive activity LED

When this LED is lit, it indicates that the CD drive or DVD drive is in use.

Hot-swap hard disk drive activity LED (hot-swap models only)

On some server models, each hot-swap drive has a hard disk drive activity LED. When this green LED is flashing, it indicates that the associated hard disk drive is in use.

When the drive is removed, this LED also is visible on the SAS/SATA backplane, next to the drive connector. The backplane is the printed circuit board behind drive bays 4 through 7.

Hot-swap hard disk drive status LED (hot-swap models only)

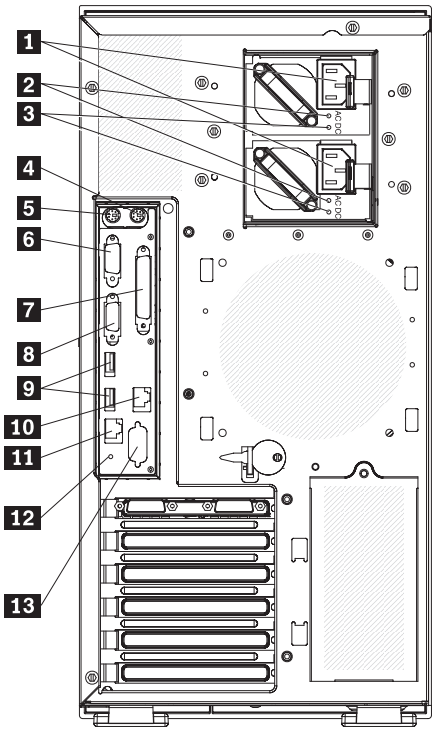
On some server models, each hot-swap hard disk drive has an amber status LED. If this amber status LED is lit, it indicates that the associated hard disk drive has failed.

If an optional ServeRAID adapter is installed in the server and the LED flashes slowly (one flash per second), the drive is being rebuilt. If the LED flashes rapidly (three flashes per second), the adapter is identifying the drive.

When the drive is removed, this LED also is visible on the SAS/SATA backplane, below the hot-swap hard disk drive activity LED.

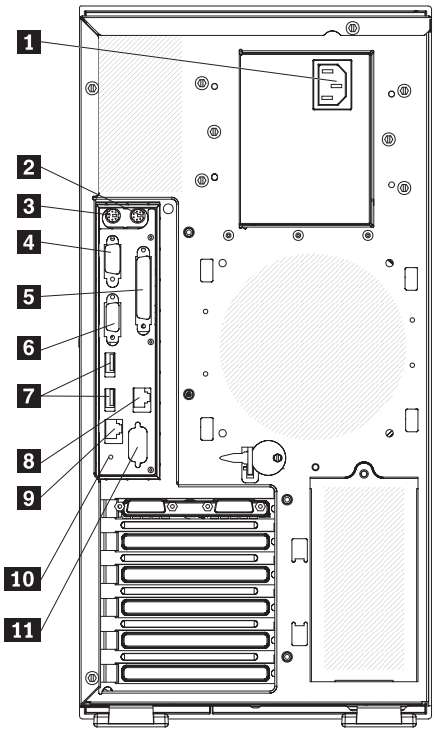
Rear view

The following illustration shows the LEDs and connectors on the rear of the hot-swap power supply models with optional redundant power. For more information about these connectors, see “Server components” on page 15.



1 Power cord connectors
2 AC power LEDs
3 DC power LEDs
4 Mouse connector
5 Keyboard connector
6 Serial 1 (COM 1) connector
7 Parallel connector
8 Video connector
9 USB connectors 3 and 4
10 (RJ45) Ethernet 10/100/1000
11 (RJ45) Ethernet 10/100 (for Remote Supervisor Adapter II SlimLine)
12 NMI button
13 Serial 2 (COM 2) connector

The following illustration shows the connectors on the rear of the non-hot-swap power supply models. For more information about these connectors, see “Server components” on page 15.



1	Power cord connectors	7	USB 3 and 4 connectors
2	Mouse connector	8	(RJ45) Ethernet 10/100/1000 connector
3	Keyboard connector	9	(RJ45) Ethernet 10/100 (for Remote Supervisor Adapter II SlimLine) connector
4	Serial 1 (COM 1) connector	10	NMI button
5	Parallel connector	11	Serial 2 (COM 2) connector
6	Video connector		

Power-cord connector
Connect the power cord to this connector.

AC power LED (hot-swap power supply models only)
This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Hardware Maintenance Manual*.

DC power LED (hot-swap power supply models only)
This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Hardware Maintenance Manual*.

Mouse connector
Connect a mouse device to this connector.

Keyboard connector
Connect a keyboard to this connector.

Serial 1 connector
Connect a 9-pin serial device to this connector.

Parallel connector
Connect a parallel device to this connector.

Video connector
Connect a monitor to this connector.

USB connectors
Connect USB devices to these connectors.

Ethernet connectors
Use these connectors to connect the server to a network.

Ethernet transmit/receive activity LED
This LED is on the Ethernet connector on the rear of the server. When this LED is lit, it indicates that there is activity between the server and the network.

Ethernet link status LED
This LED is on the Ethernet connector on the rear of the server. When this LED is lit, it indicates that there is an active connection on the Ethernet port.

Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the service processor (the baseboard management controller (BMC) or optional Remote Supervisor Adapter II SlimLine) is shut down; however, the server can respond to remote requests from the service processor, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to ac power but not turned on.

Turning on the server

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, and one or more fans might start running to provide cooling while the server is connected to power. You can turn on the server and start the operating system by pressing the power-control button.

The server also can be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If your operating system supports the systems-management software for an optional Remote Supervisor Adapter II SlimLine, the systems-management software can turn on the server.

Note: When 4 GB or more of memory (physical or logical) is installed, some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured peripheral component interconnect (PCI, PCI Express, or PCI-X) options.

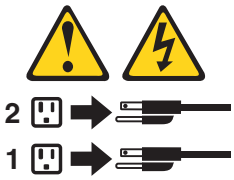
Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to remote requests to turn on the server. While the server remains connected to ac power, one or more fans might continue to run. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



The server can be turned off in any of the following ways:

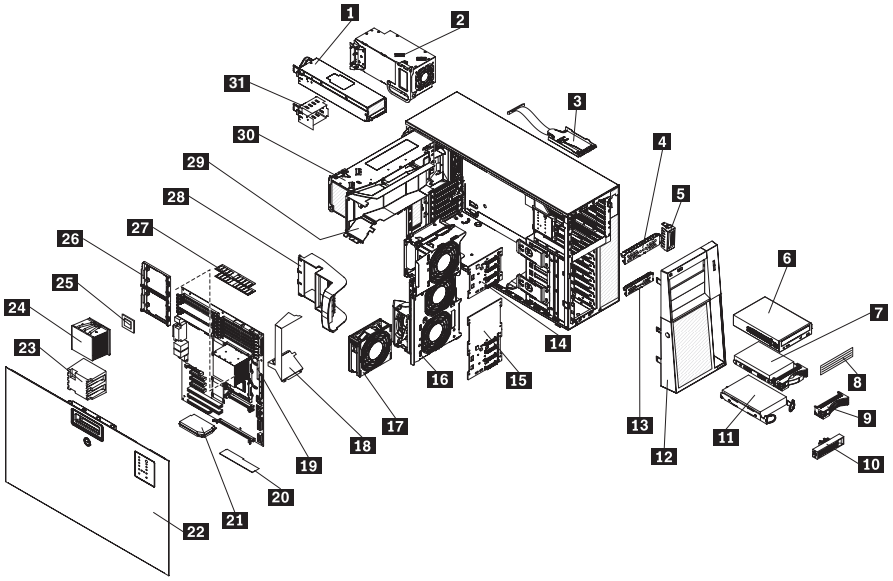
- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- If an optional Remote Supervisor Adapter II SlimLine is installed in the server, the server can be turned off from the Remote Supervisor Adapter II SlimLine user interface.
- The server can turn itself off as an automatic response to a critical system failure.

Chapter 2. Installing optional devices

Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Hardware Maintenance Manual* for diagnostic information.

Server components

The following illustration shows the major components in the server. The illustrations in this document might differ slightly from your hardware.



1	Hot-swap power supply (some models)	17	Hot-swap fan
2	Fixed power supply (some models)	18	Processor baffle
3	Control panel assembly	19	System board
4	Drive bay EMC shield	20	ServeRAID 8k-l (TD100) or ServeRAID 8k (TD100x)
5	USB cable assembly	21	Voltage regulator module (VRM)
6	CD/DVD drive	22	Cover
7	Hot-swap drive	23	Heat sink filler
8	CD/DVD drive trim piece	24	Heat sink
9	Hot-swap drive trim piece	25	Microprocessor
10	Simple-swap drive trim piece	26	Heat sink retention bracket
11	Simple-swap drive	27	DIMMs
12	Bezel	28	Rear adapter retention bracket
13	Hard disk drive EMC shield	29	DIMM air duct
14	SAS/SATA backplane	30	Power supply cage
15	SATA backplate	31	Hot-swap power supply filler
16	Fan assembly		

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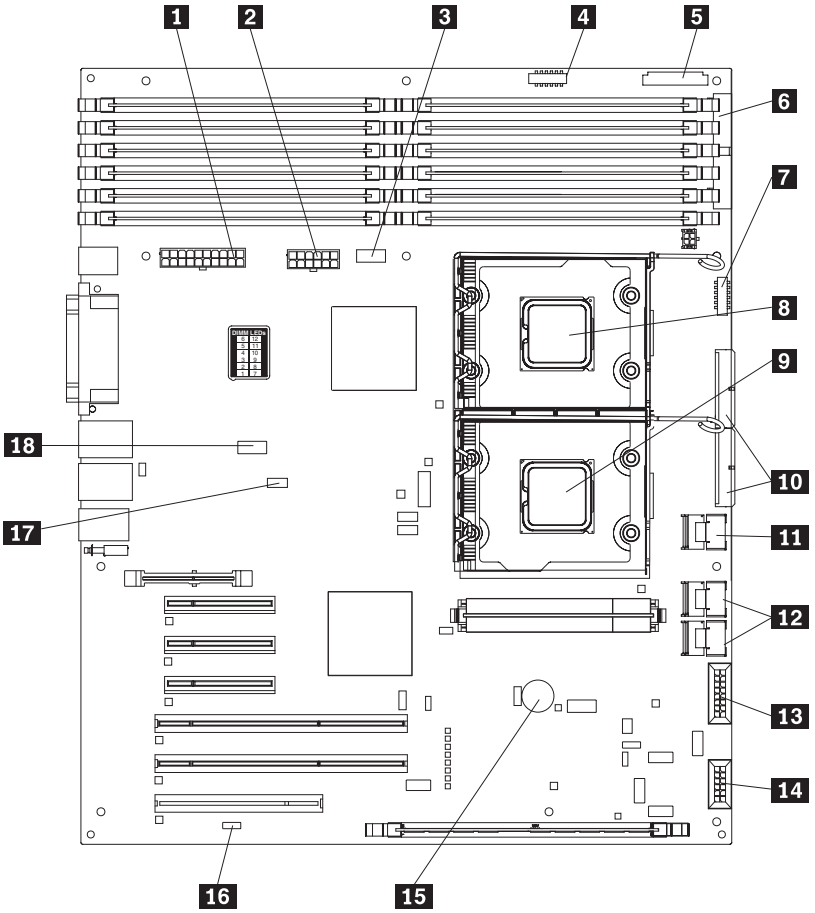
System-board internal connectors

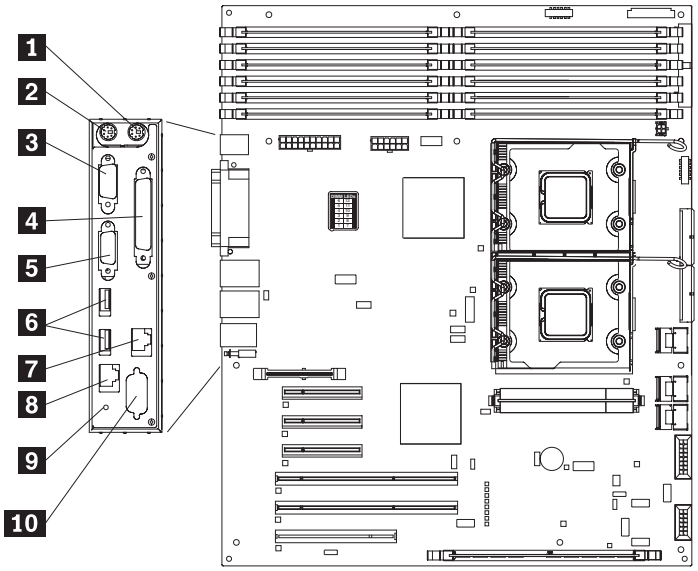
The following illustration shows the internal connectors on the system board.



1	Main power	10	SAS/SATA backplane power
2	Power	11	Simple-swap SATA backplate
3	Power	12	Hot-swap SAS/SATA signal
4	USB tape	13	Hot-swap main fan
5	Front panel	14	Hot-swap fan (redundant)
6	Primary IDE	15	Battery
7	Front USB	16	Reserved
8	Microprocessor 1	17	Serial 2 (COM 2) header
9	Microprocessor 2	18	Rear fan

System-board external connectors

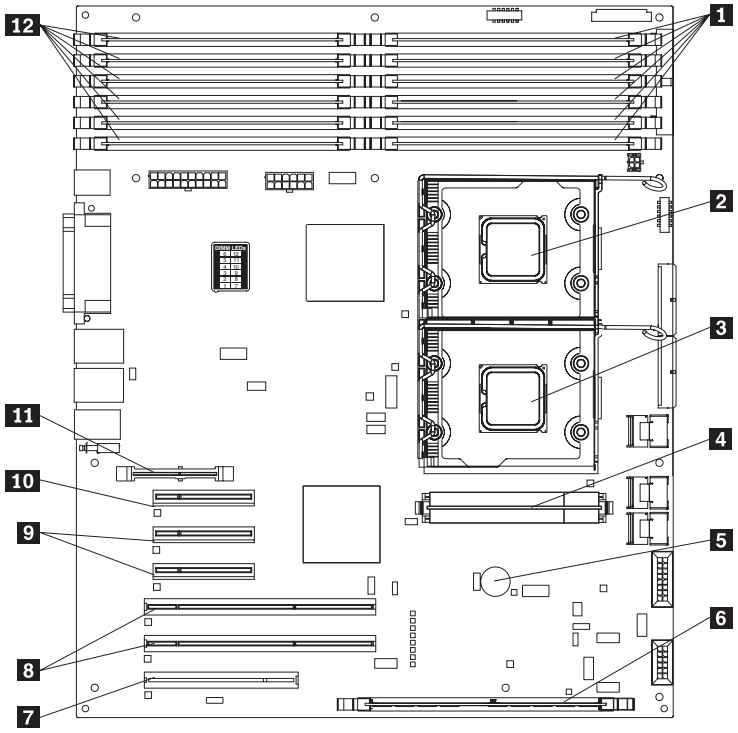
The following illustration shows the external input/output (I/O) connectors on the system board.



1	Mouse connector	6	USB connectors (2)
2	Keyboard connector	7	(RJ45) Ethernet 10/100/1000 connector
3	Serial 1 (COM 1) connector	8	(RJ45) Ethernet 10/100 (for Remote Supervisor Adapter II SlimLine) connector
4	Parallel connector	9	NMI button
5	Video connector	10	Serial 2 (COM 2) connector

System-board optional-device connectors

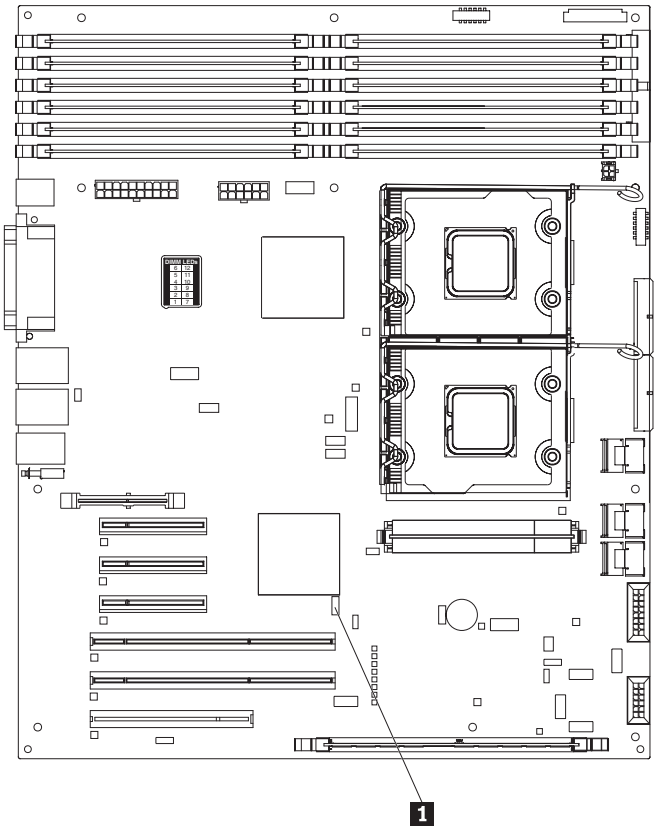
The following illustration shows the system-board connectors for user-installable options.



1	DIMM connectors (6)	7	PCI 32 bit/33 MHz connector
2	Microprocessor 1 connector	8	PCI-X 64 bit/133 MHz connector
3	Microprocessor 2 connector	9	PCI Express x8 (x8) connector
4	VRM connector	10	PCI Express x8 (x4) connector
5	Battery	11	System-management Ethernet connector
6	RAID adapter	12	DIMM connectors (6)

System board switches

The following illustration shows the SW4 switch (Boot block/Clear CMOS) 1 on the system board.



1 Boot block/Clear CMOS switch (SW4)

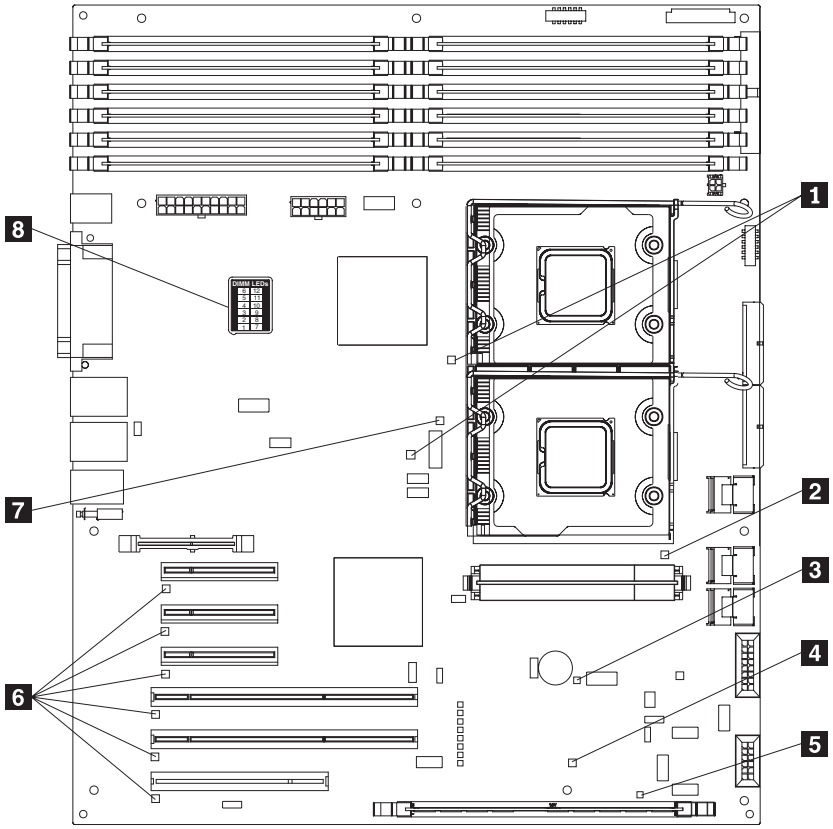
The following table describes the function of each pin on the SW4 switch (Boot block/Clear CMOS) on the system board.

Table 3. System board SW4 switch

Switch pin number	Description
1	Boot block: • When this switch is on **1**, this is the normal mode. • When this switch is toggled to **On**, this enables the system to recover if the BIOS code becomes damaged. See the *Hardware Maintenance Manual* for information about recovering from a BIOS update failure.
2	Clear CMOS: • When this switch is on **2**, this is the normal mode. This keeps the CMOS data. • When this switch is toggled to **On**, this clears the CMOS data, which clears the power-on password and administrator password.

System board LEDs

The following illustration shows the light-emitting diodes (LEDs) on the system board.



1	Microprocessor error LED (2)	5	ServeRAID error LED
2	VRM error LED	6	PCI Error LED (6)
3	Battery LED	7	Microprocessor mismatch LED
4	BMC heartbeat LED	8	DIMM error LEDs 1 through 12

For more information about the system board LEDs, see the *Hardware Maintenance Manual*.

Installation guidelines

Before you install options, read the following information:

- Read the safety information that begins on page v, the guidelines in “Working inside the server with the power on” on page 22, and “Handling static-sensitive devices” on page 22. This information will help you work safely.
- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, complete the following steps.

  Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TD100 and TD100x**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.

- Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Hardware Maintenance Manual* for diagnostic information.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- If you must start the server while the cover is removed, make sure that no one is near the server and that no tools or other objects have been left inside the server.
- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
  - Make sure that you can stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not have to turn off the server to install or replace hot-swap power supplies and hot-swap drives.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing and installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you have to access the inside of the server, you might find it easier to lay the server on its side.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of options for the server, see http://www.lenovo.com/thinkserver.

System reliability guidelines

To help ensure proper system cooling and system reliability, make sure that the following requirements are met:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan as soon as possible.
- You have replaced a hot-swap drive within 2 minutes of removal.

Working inside the server with the power on

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

Some models support hot-swap devices and are designed to operate safely while they are turned on and the cover is removed. Follow these guidelines when you work inside a server that is turned on.

- Avoid wearing loose-fitting clothing on your forearms. Button long-sleeved shirts before working inside the server; do not wear cuff links while you are working inside the server.
- Do not allow your necktie or scarf to hang inside the server.
- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, that could fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

Attention: Static electricity can damage the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available. Always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.

- While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Removing the bezel

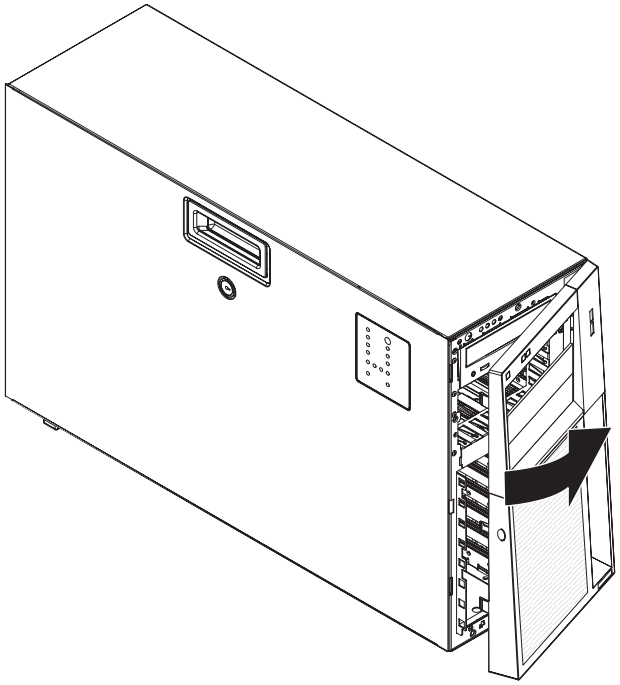
Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Hardware Maintenance Manual* for diagnostic information.

To remove the bezel, complete the following steps:

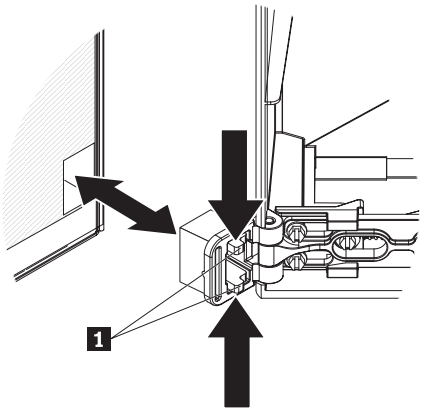
Note: The illustrations in this document might differ slightly from your hardware.

1. Read the safety information that begins on page v and “Installation guidelines” on page 20.
2. Unlock the side cover.

   Note: You must unlock the side cover to remove the bezel.
3. Position your finger on the depressed area on the left side of the bezel and rotate the bezel away from the server.



4.



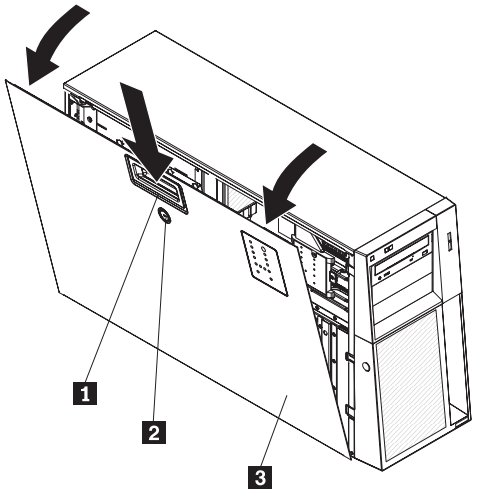
Note: The bezel also will disengage from the chassis hinges if you rotate the bezel beyond 180° or if excessive pressure is applied to the bezel. Do not be alarmed because this is how the bezel was designed. The bezel is designed with breakaway hinges so that you can easily reattach it to the chassis.
Press the retention tabs **1** on the hinge assembly toward each other and pull the hinge assembly out of the chassis.

Removing the side cover

Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Hardware Maintenance Manual* for diagnostic information.

To remove the server side cover, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 20.
2. Turn off the server and all attached devices (see “Turning off the server” on page 14); then, disconnect all power cords and external cables.
3. Unlock the side cover.
4. Press the cover-release latch down (as indicated by the two arrows); then, remove the cover and set it aside.



1 Cover release latch
2 Lock
3 Left-side cover

5. Lift the side cover off the server and set it aside.

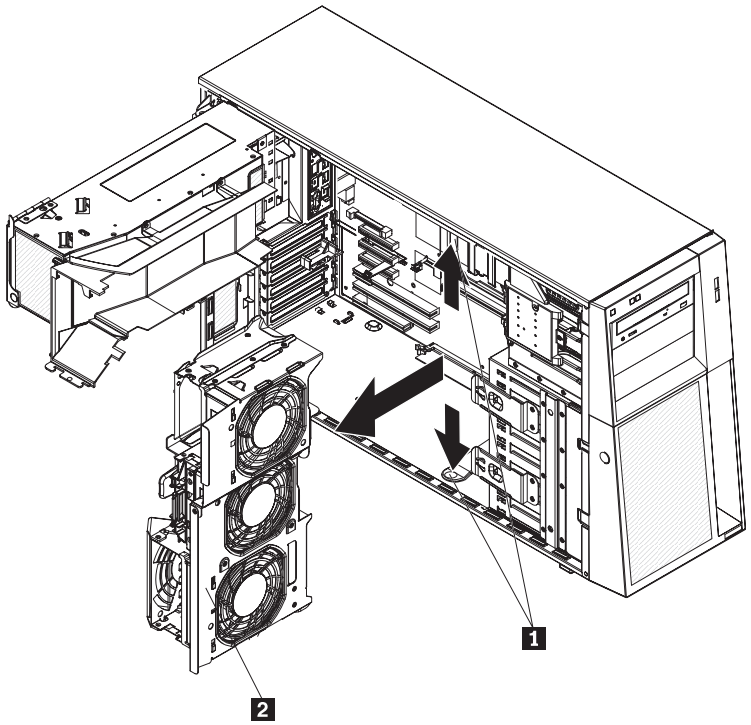
To replace the side cover, see “Reinstalling the side cover” on page 57.

Attention: For proper cooling and airflow, replace the cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the cover removed might damage server components.

Removing the front fan cage assembly

To remove the front fan cage assembly, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 20.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Lay the server on its side.
4. Unlock the side cover.
5. Remove the side cover (see “Removing the side cover” on page 25).
6. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models: lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
7. Press in on the front fan cage assembly release buttons **1** on the sides of the chassis to release the fan cage assembly **2** from the connector on the chassis. Lift the fan cage assembly up and out of the chassis and set it aside.

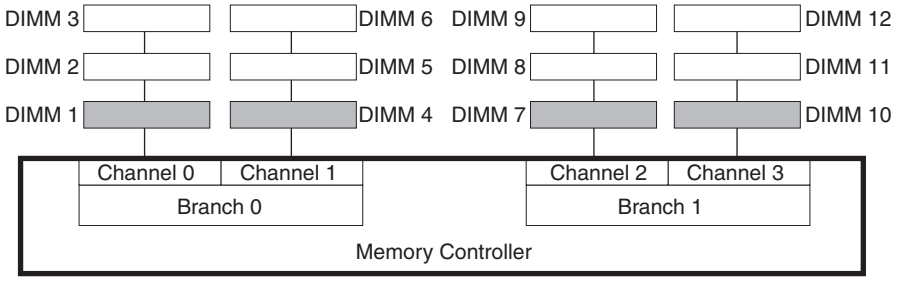


Installing a memory module

The following notes describe the types of dual inline memory modules (DIMMs) that the server supports and other information that you must consider when installing DIMMs:

- The server supports industry-standard, 1.8 V, 240-pin, 667 MHz, PC2-5300 double-data-rate 2 (DDR2), dynamic random-access memory (DRAM) with error correcting code (ECC) fully buffered dual inline memory modules (DIMMs). These DIMMs must be compatible with the latest DDR2 667 MHz DRAM fully buffered DIMM specification. For a list of options for the server, see http://www.lenovo.com/thinkserver.
- **TD100 models:** The DIMM options that are supported for the server are 512 MB, 1 GB , and 2 GB in x4 or x8 technology, single-rank or double-rank. The server supports a minimum of 1 GB and a maximum of 32 GB (reduced to 16 GB in mirrored mode) of system memory.
- **TD100x models:** The DIMM options that are supported for the server are 1 GB, 2 GB, and 4 GB in x4 or x8 technology, single-rank or double-rank. The server supports a minimum of 1 GB and a maximum of 48 GB (reduced to 24 GB in mirrored mode) of system memory.
- The system board provides eight or 12 functional DIMM connectors (depending on the model) and supports two-way memory interleaving when DIMMs are installed in pairs.

  Note: DIMM connectors 3, 6, 9, and 12 are not functional for TD100 models. Do not install DIMMs in these four connectors and do not remove the DIMM thermal baffles installed in these connectors unless you need to replace the system board.
- When installing multiple pairs, always install the DIMMs with the most capacity in the first slots. For example, if you had a pair of 1 GB DIMMs and a pair of 4 GB DIMMs, you would install the 4 GB DIMMs in slots 1 and 4.
- The memory controller has four fully buffered DIMM channels that are organized into two branches. Each branch has two channels and each channel controls two or more DIMMs. DIMMs that are next to each other (for example, DIMM connector 1 and DIMM connector 4) within the channels of a branch must be identical in size, type, speed, and technology. However, the DIMMs in the connector above or below each other within the channels of a branch do not have to be identical (for example, the DIMMs in DIMM connector 1 and DIMM connector 2 do not have to be identical). The following illustration shows how the memory controller is organized into branches and channels with a pair of DIMMs installed in each branch.



- The server can operate in two major modes: mirroring and non-mirroring (normal). The server can also operate in a single-channel mode when one DIMM is installed.

- The server supports memory mirroring (mirroring mode) and online-spare memory.
  - Memory mirroring replicates and stores data on DIMMs within two branches simultaneously. You must enable memory mirroring through the Configuration/Setup Utility program. To enable memory mirroring in the Configuration/Setup Utility program, select **Devices and I/O Ports → Advanced Chipset Control → Memory Branch Mode**. Use the arrow keys to change the Memory Branch Mode setting to **Mirror**; then, save your changes. For more information on the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility program" on page 61. When you use memory mirroring, consider the following information:
    - For TD100 models, the maximum available memory is reduced to 16 GB, instead of the 32 GB available in non-mirroring mode.
    - For TD100x models, the maximum available memory is reduced to 24 GB, instead of the 48 GB available in non-mirroring mode.
    - The minimum memory configuration is four identical DIMMs. You must install identical pairs of fully buffered, dual-inline memory modules (DIMMs) in all four DIMM connectors (same size, type, speed, and technology). These DIMMs must span across both branches and all four channels. For example, when you install the first four DIMMs, you must install two DIMMs in branch 0 (one in channel 0 and one in channel 1) and two DIMMs in branch 1 (one in channel 2 and one in channel 3). See Table 4 for the DIMM installation sequence.
    - When you upgrade the server to eight or 12 DIMMs, the DIMMs that are next to each other (for example, DIMM connector 1 and DIMM connector 4) within the channels of a branch must be identical in size, type, speed, and technology. However, the DIMMs in the connectors above or below each other within the channels of a branch do not have to be identical to each other (for example, the DIMMs in DIMM connector 1 and DIMM connector 2).
    - Both branches operate in dual-channel mode.

    The following table shows the DIMM configuration upgrade sequence for operating in mirroring mode.

Table 4. DIMM upgrade configuration sequence in mirroring mode

Number of DIMMs	DIMM connectors
4	1, 4, 7, 10
8	1, 4, 7, 10, 2, 5, 8, 11
12 (TD100x Machine Types 4203, 4204, 4205, 4206)	1, 4, 7, 10, 2, 5, 8, 11, 3, 6, 9, 12
Note: For TD100 models (Machine Types 6398, 6399, 6419, 6429), DIMM connectors 3, 6, 9, and 12 are not functional. Do not install DIMMs in these connectors.	

  - Online-spare memory disables a failed rank pair of DIMMs from the system configuration and activates an online-spare rank pair of DIMMs to replace the failed rank pair of DIMMs. For an online-spare pair of DIMMs to be activated, you must enable this feature and have installed an additional rank pair of DIMMs of the same speed, type, size (or larger), and technology as the failed pair of DIMMs. You must enable the feature through the Configuration/Setup Utility program. To enable online-spare memory in the Configuration/Setup Utility program, select **Devices and I/O Ports → Advanced Chipset Control → Memory Branch Mode**. Use the arrow keys to change the setting for Branch 0 Rank Sparing or Branch 1 Rank Sparing to **Enabled**; then, save your

changes. For more information on the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 61. When you use online-spare memory, you must consider the following information:

- You cannot enable online-spare memory while the server is operating in mirroring mode.
- The minimum memory configuration is two single-rank DIMMs installed in branch 0, DIMM connector 1 (in channel 0) and connector 4 (in channel 1); however, online-sparing is not supported with this configuration.
- To support online-sparing in branch 0, you must add a second pair of DIMMs. The spare pair of DIMMs can be single-rank or double-rank and must be the same speed, type, size (or larger), and technology as the failed pair of DIMMs. The spare pair must be installed in branch 0, DIMM connector 2 (in channel 0) and connector 5 (in channel 1). However, if the DIMMs are double-rank and you install the spare pair of DIMMs in branch 1, DIMM connector 7 (channel 2) and connector 10 (channel 3) rather than branch 0, then branch 1 will support online-sparing and branch 0 will not.
- Branch 0 and branch 1 operate independently.

- The following notes apply when the server operates in non-mirroring mode (normal mode):
  - DIMMs must be installed in matched pairs. If you install a second pair of DIMMs in DIMM connector 7 and DIMM connector 10, they do not have to be the same size, speed, type, and technology as the DIMMs in DIMM connector 1 and DIMM connector 4. However, the size, speed, type, and technology of the DIMMs that you install in DIMM connector 7 and DIMM connector 10 must match each other.
  - The following table shows the DIMM upgrade configuration sequence for operating in non-mirroring mode (normal mode).

Table 5. DIMM upgrade configuration sequence in non-mirroring mode (normal)

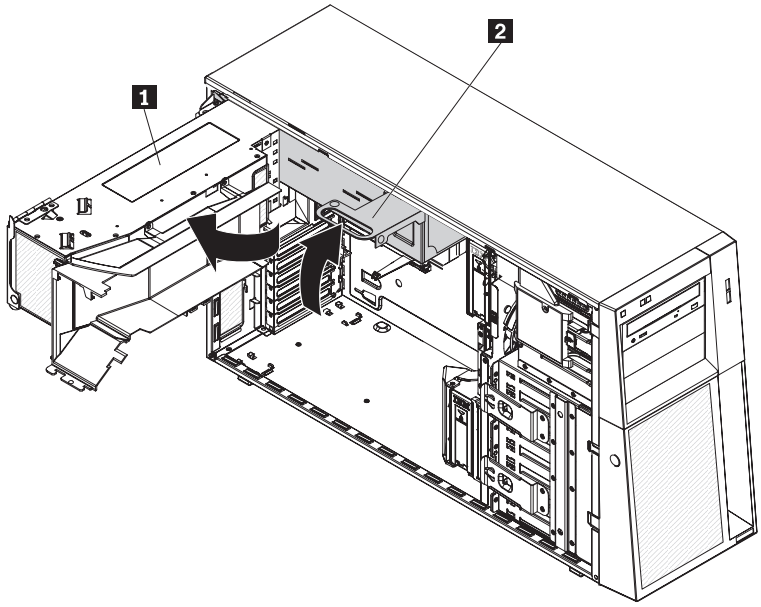
Number of DIMMs	**DIMM connectors**
2	1, 4
4	1, 4, 7, 10
6	1, 4, 7, 10, 2, 5
8	1, 4, 7, 10, 2, 5, 8, 11
10 (TD100x Machine Types 4203, 4204, 4205, 4206)	1, 4, 7, 10, 2, 5, 8, 11, 3, 6
12 (TD100x Machine Types 4203, 4204, 4205, 4206)	1, 4, 7, 10, 2, 5, 8, 11, 3, 6, 9, 12
Note: For TD100 models (Machine Types 6398, 6399, 6419, 6429), DIMM connectors 3, 6, 9, and 12 are not functional. Do not install DIMMs in these connectors.	

- The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. To view the total amount of installed memory and the amount of configured memory, run the Configuration/Setup Utility program and select **System Summary** from the menu. For additional information, see “Using the Configuration/Setup Utility program” on page 61.
- When you restart the server after adding or removing a DIMM, the server displays a message that the memory configuration has changed.

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

To install a DIMM, complete the following steps:

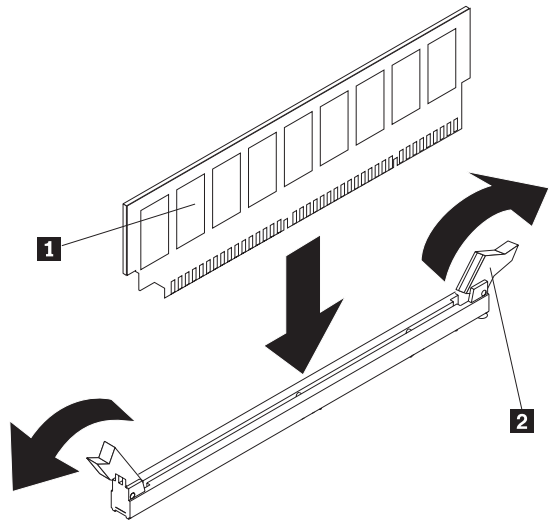
1. Read the safety information that begins on page v and “Installation guidelines” on page 20.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock the side cover.
4. Remove the side cover (see “Removing the side cover” on page 25).
5. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle **2** and pull the power-supply cage assembly **1** all the way up until the retainer latch locks the cage in place on the chassis.



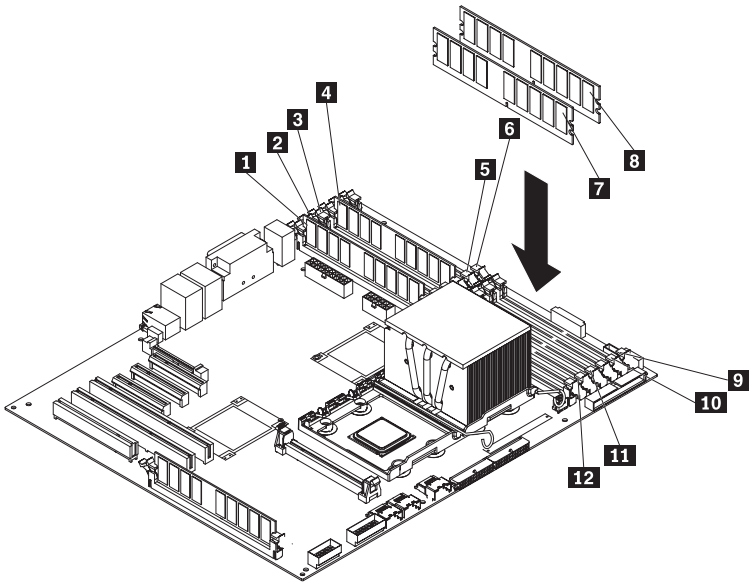
6. Locate the DIMM connectors on the system board. Determine the connector in which you will install the DIMMs. Install the DIMMs in the sequence indicated in Table 4 on page 29 and Table 5 on page 30.

   Note: DIMM connectors 3, 6, 9, and 12 are not functional in TD100 models. Do not install DIMMs in these connectors.
   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.

7. Open the retaining clips and, if necessary, remove any existing DIMM.
8. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the server. Then, remove the new DIMM from the package.
9. Turn the DIMM so that the DIMM keys align correctly with the slot.
10. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector **1** and **2**.



11. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, and then reinsert it.

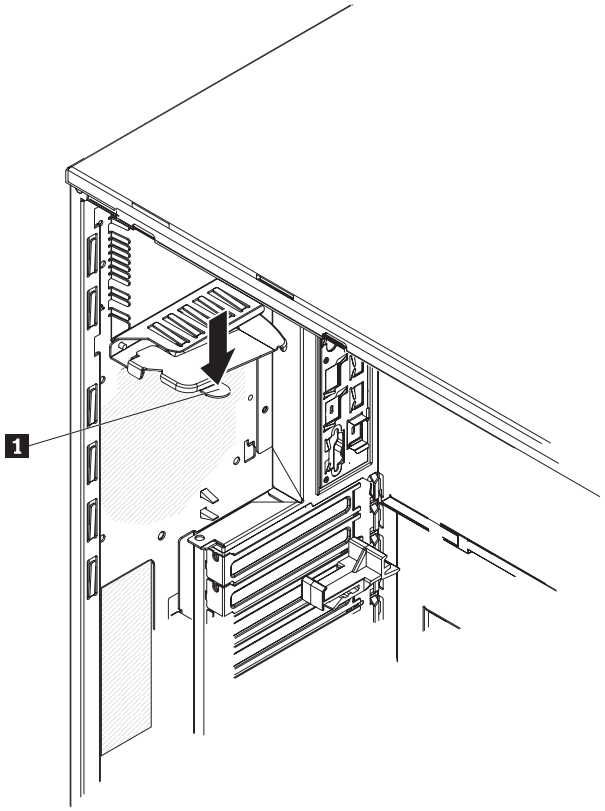


1	DIMM 1 connector	**7**	DIMM 7
2	DIMM 2 connector	**8**	DIMM 10
3	DIMM 3 connector	**9**	DIMM 12 connector
4	DIMM 4 connector	**10**	DIMM 11 connector
5	DIMM 5 connector	**11**	DIMM 9 connector

6 DIMM 6 connector

12 DIMM 8 connector

12. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab 1 and rotate the power-supply cage assembly into the chassis.



13. If you have a hot-swap model, reinstall the hot-swap power-supplies.

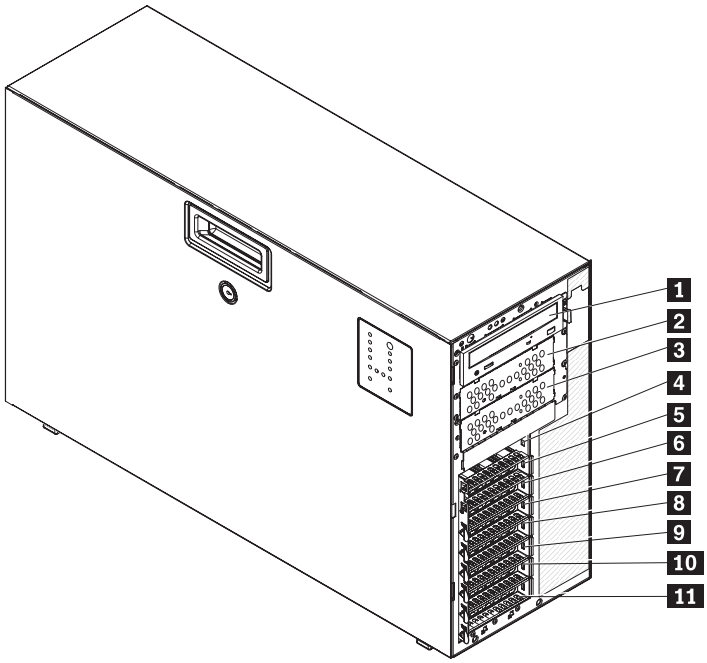
If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 55.

Installing a drive

Depending on the server model, the server might have come with an integrated drive electronics (IDE) CD-ROM, CD-RW, or DVD/CD-RW combo drive in bay 1.

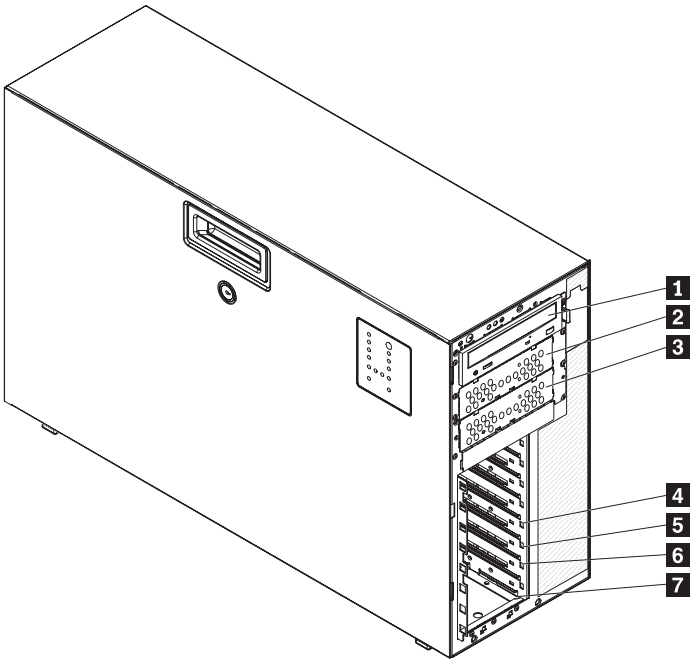
The following are illustrations of the server and the location of the drive bays. Your hardware might differ, depending on the model.

The following is an illustration of the hot-swap server models (TD100x).



1	Bay 1	7	Bay 7
2	Bay 2	8	Bay 8
3	Bay 3	9	Bay 9
4	Bay 4	10	Bay 10
5	Bay 5	11	Bay 11
6	Bay 6		

The following is an illustration of the simple-swap server models (TD100).



1	Bay 1	7	Bay 5
2	Bay 2	8	Bay 6
3	Bay 3	9	Bay 7
4	Bay 4		

The following notes describe the types of drives that the server supports and other information that you must consider when installing a drive:

- Make sure that you have all the cables and other equipment that is specified in the documentation that comes with the drive.
- Check the instructions that come with the drive to see whether you have to set any switches or jumpers on the drive. If you are installing a SATA or SAS device, be sure to set the SATA or SAS ID for that device.
- External USB diskette drives, tape drives, CD drives, CD-RW drives, and DVD/CD-RW combo drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, and 3 only.
- To install a 3.5-inch drive in a 5.25-inch bay, you must use a 5.25-inch conversion kit.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI, PCI Express, and PCI-X slots covered or occupied. When you install a drive or PCI, PCI Express, or PCI-X adapter, save the EMC shield and filler panel from the bay or the PCI, PCI Express, or PCI-X adapter slot cover in the event that you later remove the drive or adapter.
- For a list of supported options for the server, see http://www.lenovo.com/thinkserver/.

Installing a hot-swap hard disk drive

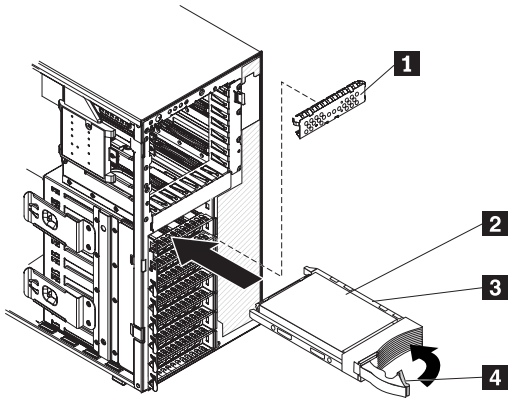
Some server models come with hot-swap SAS or hot-swap SATA hard disk drives. Before you install a hot-swap hard disk drive, read the following information:

- The hot-swap drives must be either all SAS hard disk drives or all SATA hard disk drives; do not mix SAS and SATA drives.
- The sequence for installing the hard disk drives is to install the drives starting from the top bay (bay 4) and go down to the bottom bay (bay 11).
- Inspect the drive tray for signs of damage.
- Make sure that the drive is correctly installed in the tray.
- All hot-swap drives must have the same throughput speed rating; mixing speed ratings might cause all drives to operate at the lower throughput speed.
- The drive ID for each hot-swap hard disk drive is printed on the bezel.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays.
- To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.
- See the documentation for your RAID controller for instructions for installing a hard disk drive.
- For TD100 (Machine Types 6398, 6399, 6419, 6429), if you want to install the maximum number (eight) of hot-swap drives, you need the 4-drive backplane option kit.
- Remove any dust shields from the signal cable connectors before installing the signal cables.

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

To install a hot-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 20.
2. Remove the bezel and cover. See “Removing the bezel” on page 24 and “Removing the side cover” on page 25 for instructions.
3. Remove the EMC shield **1** from the bay in which you want to install the drive.
4. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
5. Install the hard disk drive **2** in the hot-swap bay:
   a. Make sure that the drive tray handle **4** is open.
   b. Align the drive assembly with the guide rails in the bay.



c. Gently slide the drive assembly into the drive bay **3** until the drive stops.

d. Push the drive tray handle to the closed (locked) position.

e. Check the hard disk drive status indicator to make sure that the hard disk drive is operating correctly. (You might have to restart the server before the drive is recognized.) If the amber hard disk drive status LED for a drive is lit continuously, it indicates that the drive is faulty and must be replaced. If the amber hard disk drive status LED for a drive is flashing slowly, this indicates that the drive is being rebuilt. If the amber hard disk drive status LED for a drive is flashing rapidly, this indicates that the controller is identifying the drive. If the green hard disk drive activity LED is flashing, it indicates that the drive is in use.

   Note: If the server is configured for RAID operation using an optional ServeRAID adapter, you might have to reconfigure your disk arrays after installing hard disk drives. See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID operation.

6. If you are installing additional hot-swap hard disk drives, do so now.

If you have other options to install or remove, do so now; otherwise go to "Completing the installation" on page 55.

IDs for hot-swap hard disk drives

Hot-swap server models have drive bays that are connected to a SAS/SATA backplane. This backplane, also known as the hot-swap-drive backplane, is the printed circuit board behind these bays.

The hot-swap-drive backplane controls the IDs for the internal hot-swap drive bays. The following table lists the IDs for the hard disk drives and backplane that are connected to hot-swap models.

Device	ID
Drive bay 4	0
Drive bay 5	1
Drive bay 6	2
Drive bay 7	3
Drive bay 8	4
Drive bay 9	5
Drive bay 10	6

Device	ID
Drive bay 11	7

Installing a simple-swap SATA hard disk drive (TD100 models only)

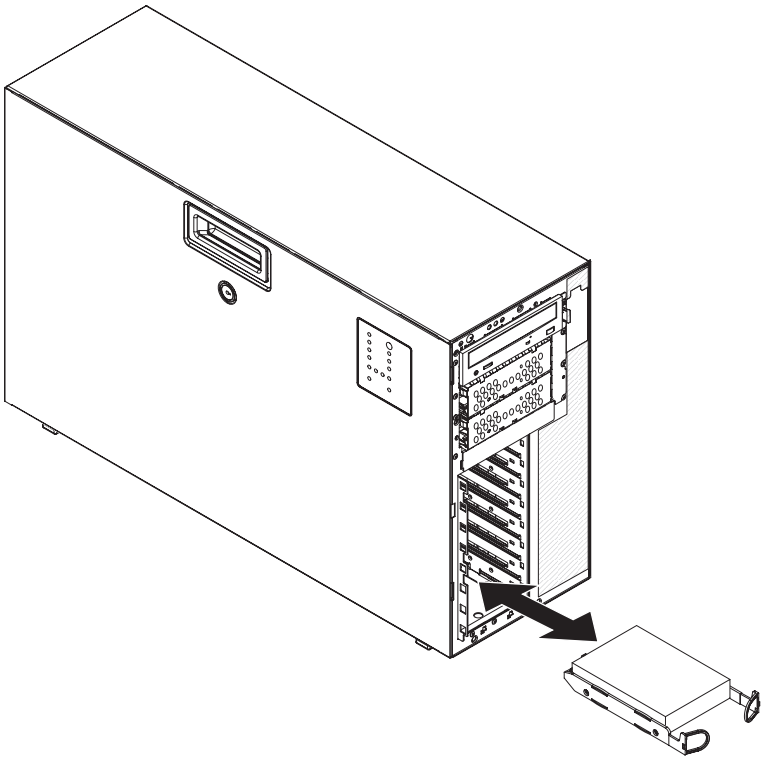
Some server models come with simple-swap SATA hard disk drives that are accessible from the front of the server. Before you install a simple-swap SATA hard disk drive, read the following information:

- You must turn off the server before installing simple-swap drives in the server.
- You can install only four simple-swap SATA hard disk drives in the server.
- The sequence for installing the hard disk drives is to install the drives starting from the bottom bay (bay 7) and go up to the top bay (bay 4).

To install a simple-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 20.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords.
3. Unlock the side cover (you cannot open or remove the bezel without unlocking the side cover).
4. Remove the bezel (see “Removing the bezel” on page 24.
5. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
6. Align the drive assembly with the guide rails in the bay (the connector end of the drive goes in first).
7. Press the drive assembly loops toward each other; then, carefully slide the drive assembly into the drive bay until it stops and release the loops.

   Note: Do not release the loops on the drive assembly until it is completely seated.



If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 55.

The simple-swap-drive backplate controls the IDs for the internal simple-swap drive bays. Always install drives into the bottom bays first, starting with ID 0.

Power and signal cables for internal drives

The server uses cables to connect parallel IDE, simple-swap SATA, hot-swap SATA and hot-swap SAS devices to the power supply and to the system board. (See “System-board internal connectors” on page 16 for the location of system-board connectors.) Review the following information before connecting power and signal cables to internal drives:

- The drives that are preinstalled in the server come with power and signal cables attached. If you replace any drives, remember which cable is attached to which drive.
- If you have only one IDE device on a cable, it must be set as a master device.
- If two IDE devices are used on a single cable, one must be designated as the master device and the other as the subordinate device; otherwise, the server might not recognize some of the IDE devices. The master and subordinate designation is determined by switch or jumper settings on each IDE device.
- When you route a cable, make sure that it does not block the airflow to the rear of the drives or over the microprocessor or DIMMs.

The following cables are provided:

- **IDE:** The wider IDE signal cable has three connectors. One of these connectors is attached to the drive, one is a spare, and the third is attached to the IDE connector on the system board. The spare connector can be used to connect an additional IDE optical drive or tape drive to the server.

The CD or DVD drive is attached to an ATA 100 signal cable. The blue connector is attached to the system board. The connector on the other end is attached to the master IDE device. The middle connector attaches to an optional optical device or tape drive.

- **Simple-swap SATA (TD100 models only):** The combination signal/power cable connects to the system board and simple-swap backplate to provide signal and power to the simple-swap SATA drives.

  Simple-swap SATA models include a combination signal/power cable connected to the system board and the simple-swap SATA backplate.
- **Hot-swap SAS or hot-swap SATA:** Hot-swap SAS and hot-swap SATA models come with a single signal cable and a single power cable that connects to the system board and the hot-swap SAS/SATA backplane to provide signal and power to the SAS or SATA drives. For TD100, If you order the 4-drive backplane option kit to upgrade to eight drives, the option kit comes with an additional signal cable and power cable.

  Note: When you install the optional 4-drive backplane option kit to upgrade to eight drives, make sure that you remove the dust shield (if one is present) from the hot-swap SAS/SATA signal connector on the system board. Carefully grasp the dust shield and pull it out of the signal connector.

For more information about the requirements for SAS cable and connecting SAS devices, see the documentation that comes with these devices.

For a list of supported options for the server, see http://www.lenovo.com/thinkserver/.

Installing an adapter

The following notes describe the types of adapters that the server supports and other information that you must consider when installing an adapter. The type of adapters that the server supports might vary, depending on your server model.

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you must change the switch setting or jumper settings on the adapter, follow the instructions that come with the adapter.
- The server comes with the following adapter connectors, or slots:
  - Slot 1, PCI Express x8 (x4)

    Important: The *x8 (x4)* designation for slot 1 identifies an x8 slot that is designed to support x4 adapters and x8 adapters that can downshift to operate at the x4 bandwidth. If you install an x8 adapter in slot 1 that can downshift to the x4 bandwidth, it will run at the x4 bandwidth. The x8 connector can be used for x4 and x8 adapters. Check the information that comes with your adapter for compatibility information.
  - Slot 2, PCI Express x8 (x8)
  - Slot 3, PCI Express x8 (x8)
  - Slot 4, PCI-X 64-bit/133 MHz
  - Slot 5, PCI-X 64-bit/133 MHz
  - Slot 6, PCI 32-bit/33 MHz
- You can install supported full-length adapters in slots 2, 3, 4 and 5. You can install only half-length adapters in slots 1 and 6.
- Universal adapters are supported in slots 4 and 5 if they are universally keyed.

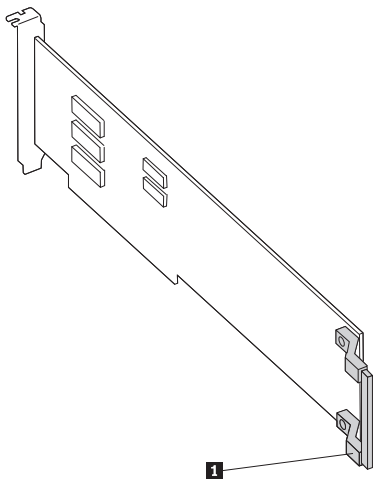
- PCI slot 6 supports half-length 5.0 V PCI adapters only.
- PCI slot 1 supports half-length 3.3 V PCI adapters only.
- PCI slots 2 through 5 support full-length 3.3 V signaling adapters only.
- For a list of supported optional devices for the server, go to: http://www.lenovo.com/thinkserver.

Note: For models that have the ServeRAID-8k SAS controller installed, the ServeRAID-8k SAS controller overrides the standard functionality of the integrated SAS/SATA controller with RAID capabilities.

To install an adapter, complete the following steps:

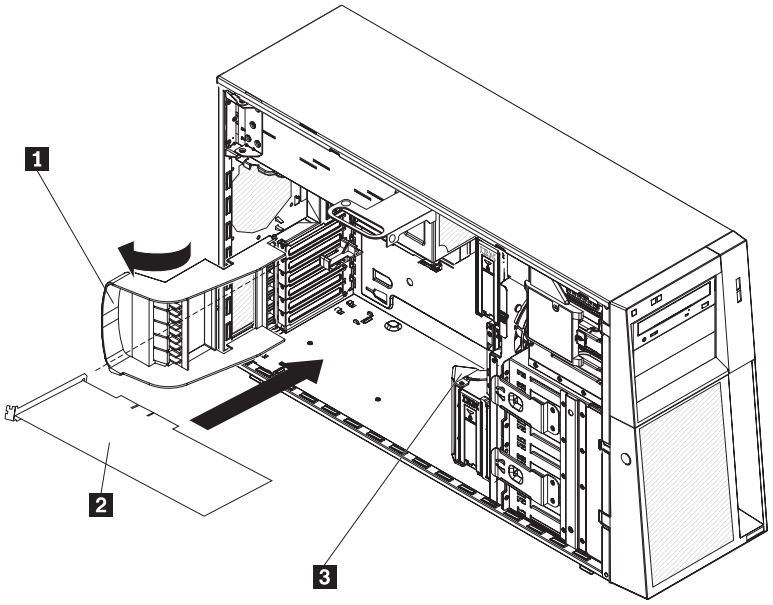
1. Read the safety information that begins on page v and “Installation guidelines” on page 20.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the side cover. See “Removing the side cover” on page 25.
3. Follow the cabling instructions that come with the adapter to set jumpers or switches, if there are any. Route the adapter cables before you install the adapter.
4. Rotate the rear adapter-retention bracket to the open (unlocked) position.
5. If you are installing a full-length adapter, press on the release lever on the right side of the front adapter-retention bracket to release the retaining tab on the left side of the bracket.
6. Remove the screw that secures the expansion-slot cover to the chassis. Store the expansion-slot cover and screw in a safe place for future use.

   Note: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the server and ensures proper ventilation of server components.
7. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.
8. If you are installing a full-length adapter, remove the adapter guide **1** (if any) from the end of the adapter.



9. Carefully grasp the adapter **2** by the top edge or upper corners, and align it with the expansion slot guides; then, press the adapter *firmly* into the expansion slot. Move the adapter directly from the static-protective package to the expansion slot.

   Note: If any adapters in the server are large or have heavy cables attached to them, you can remove the rear adapter-retention bracket **1** and secure all of the adapters with expansion-slot screws (the expansion-slot screws are located on the side of the optical drive cage).



10. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans.
11. Rotate the rear adapter-retention bracket to the closed (locked) position.
12. Rotate the front adapter-retention bracket **3** to the closed (locked) position.

If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 55.

Installing a microprocessor

The following notes describe the type of microprocessor that the server supports and other information that you must consider when installing a microprocessor:

- The server comes with one microprocessor installed, but supports up to two microprocessors.

  Note: A microprocessor must be installed and removed only by a trained service technician.
- Read the documentation that comes with the microprocessor to determine whether you have to update the basic input/output system (BIOS) code. To download the most current level of BIOS code for your server, go to:
  1. Go to: http://www.lenovo.com/support.
  2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
  3. From **Family** list, select **ThinkServer TD100 and TD100x**, and click **Continue**.

4. Click **Downloads and drivers** to download firmware updates.

- When you install a second microprocessor, you must also install the voltage regulator module (VRM), which comes with the microprocessor option kit, in the VRM connector on the system board.
- Some models support dual-core microprocessors or quad-core microprocessors. Do not mix dual-core microprocessors and quad-core microprocessors in the same system. Install all dual-core or all quad-core microprocessors in the server.
- To ensure that the server operates correctly, use microprocessors that have the same cache and type, and the same clock speed. The microprocessor internal and external clock frequencies must be identical. You can use the Configuration/Setup Utility program to determine the specific type of microprocessor that is installed on the system board.
- The microprocessor speeds are automatically set for this server; therefore, you do not have to set any microprocessor frequency-selection jumpers or switches.
- When the thermal-grease protective cover (for example, a plastic cap or tape liner) is removed from the heat sink, do not touch the thermal grease on the bottom of the heat sink or set down the heat sink.
- If you have to replace a microprocessor, call for service.
- To order additional microprocessor options, contact your Lenovo marketing representative or authorized reseller.

See “System-board optional-device connectors” on page 18 for the location of the microprocessor connectors and the VRM connector.

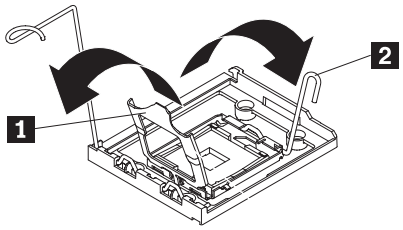
To install an additional microprocessor, complete the following steps:

1. Read the safety information beginning on page v, and “Installation guidelines” on page 20.
2. Turn off the server and disconnect all power cords and external cables (see “Turning off the server” on page 14); then, unlock and remove the server cover (see “Removing the side cover” on page 25).
3. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
4. Remove the microprocessor air baffle by grasping the two tabs and squeezing them together slightly and lift the baffle out of the server.
5. Rotate the rear system fan air baffle up out of the way by grasping the tab and pulling the baffle all the way up; then, slide it outward over the rear of the server until it locks in place.
6. Locate the second microprocessor connector on the system board.
7. Install the VRM in the VRM connector:
   a. Turn the VRM so that the VRM keys align correctly with the slot connector.
   b. Firmly press the VRM straight down into the connector by applying pressure on both ends of the VRM simultaneously.

c. Make sure that the retaining clips are in the locked position when the VRM is firmly seated in the connector.

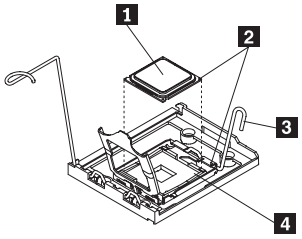
8. Install the microprocessor:
   a. Touch the static-protective package that contains the microprocessor to any unpainted metal surface on the server. Then, remove the microprocessor from the package.
   b. Remove the protective cover, tape, or label from the surface of the microprocessor socket, if any is present.
   c. Open the microprocessor bracket frame 1 .
   d. Rotate the release lever 2 on the microprocessor socket from its closed and locked position to its fully open position.

      Attention: Make sure that the release lever on the microprocessor socket is in the fully open position before you insert the microprocessor in the socket. Failure to do so might result in permanent damage to the microprocessor, microprocessor socket, and system board.



      Attention:
      - Do not use excessive force when pressing the microprocessor into the socket.
      - Make sure that the microprocessor is oriented and aligned with land number 1 in the socket before you try to close the lever.

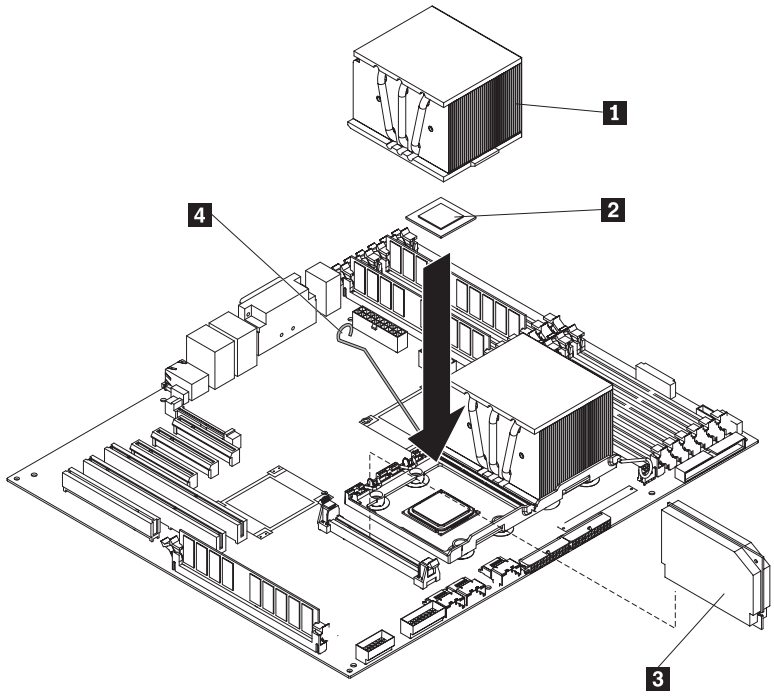
   e. Align the microprocessor 1 with the socket (note the alignment mark 2 and the position of the notches); then, carefully place the microprocessor on the socket 4 and close the microprocessor bracket frame.



   f. Carefully close the release lever 3 to secure the microprocessor in the socket.

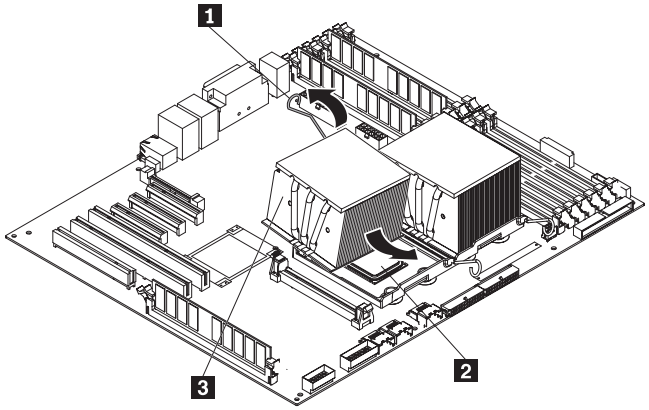
9. Install the heat sink.

   Attention: Do not touch the thermal grease on the bottom of the heat sink or set down the heat sink after you remove the plastic cover. Touching the thermal grease will contaminate it.
   a. Make sure that the heat-sink lever 4 is in the open position.
   b. Remove the plastic protective cover from the bottom of the heat sink 1 .
   c. Align the heat sink 1 above the microprocessor 2 with the thermal-grease side down. Press firmly on the heat sink.



1 Heatsink 2
2 Microprocessor 2
3 Microprocessor 2 VRM
4 Microprocessor release lever

d. Slide the flange of the heat sink into the opening beneath the retainer bracket.



1 Heat-sink locking lever
2 Microprocessor
3 Heat-sink

e. Press down firmly on the heat sink until it is seated securely.

f. Rotate the heat-sink lever to the closed position and hook it underneath the lock tab.

10. Reinstall the microprocessor air baffle.
11. Rotate the rear system fan air baffle back into the server.
12. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.
13. If you have a hot-swap model, reinstall the hot-swap power supplies.

If you have other options to install or remove, do so now. Otherwise, go to “Completing the installation” on page 55.

Installing a hot-swap power supply

The following notes describe the type of power supply that the server supports and other information that you must consider when installing a power supply. Information in this section applies only to server models that have hot-swap power supplies. If you have a non-hot-swap model, it comes with only one 670-watt power supply, which must be replaced only by a service technician.

- The server comes with one power supply.
- The redundant mode requires two 835-watt hot-swap power supplies in the server. You must install an additional redundant power and cooling option kit (the option kit comes with an 835-watt hot-swap power supply and three hot-swap fans) to upgrade to redundant mode.

When you remove or install a hot-swap power supply, observe the following precautions.

Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 11:

CAUTION:
The following label indicates sharp edges, corners, or joints nearby.

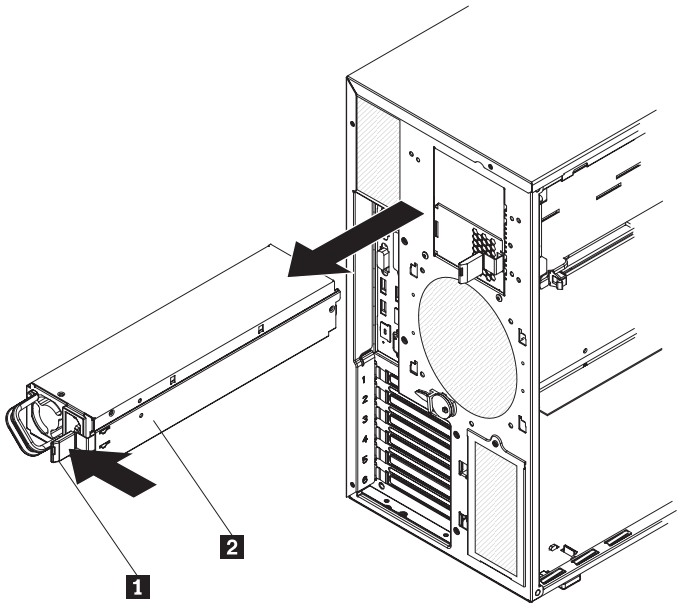
Statement 17:

CAUTION:
The following label indicates moving parts nearby.

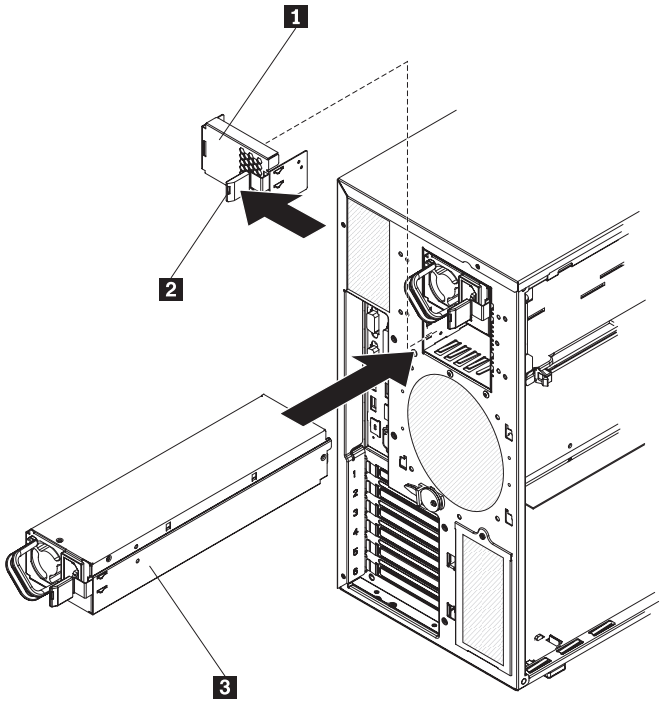
To replace a hot-swap power supply, complete the following steps:

1. Review the safety information that begins on page v and “Installation guidelines” on page 20.

   Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.
2. Disconnect the power cord from the power supply that is to be removed.
3. If you are replacing a power-supply **1**, press down on the orange release latch **2** and pull the power supply out of the bay, using the handle.



4. If you are instructed to return the hot-swap power supply to Lenovo, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
5. Touch the static-protective package that contains the hot-swap power supply to any unpainted metal surface on the server; then, remove the power supply from the package and place it on a static-protective surface.
6. Place the power supply into the bay guides.



1 Power supply filler
2 Release latch
3 Power supply

7. Press down on the orange release lever and push the power supply toward the front of the chassis until it locks into place.
8. Connect one end of the power cord into the connector on the back of the power supply and connect the other end of the power cord into a properly grounded electrical outlet.
9. Make sure that both the ac and dc power LEDs on the rear of the power supply are lit, indicating that the power supply is operating correctly.
10. Connect the power cord.

If you have other options to install or remove, do so now; otherwise go to “Completing the installation” on page 55.

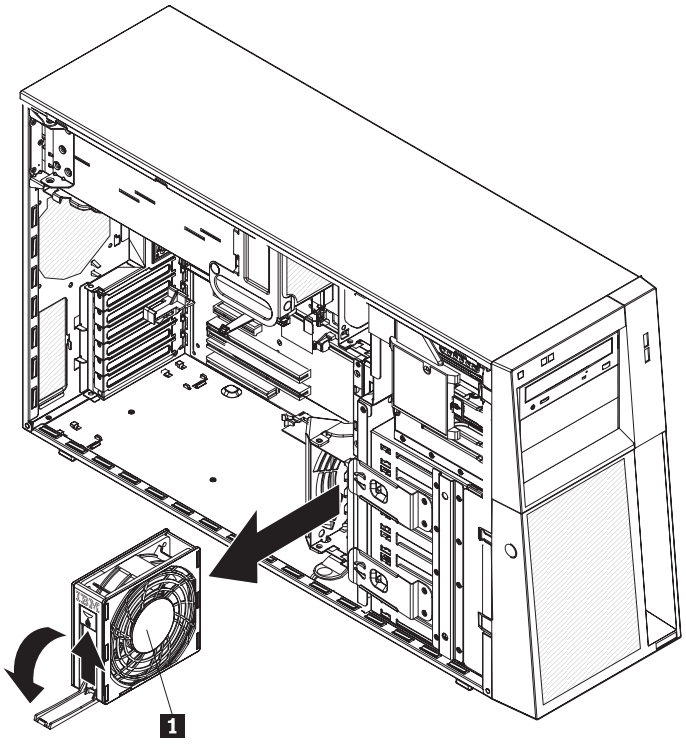
Installing a hot-swap fan

To replace a hot-swap fan, complete the following steps:

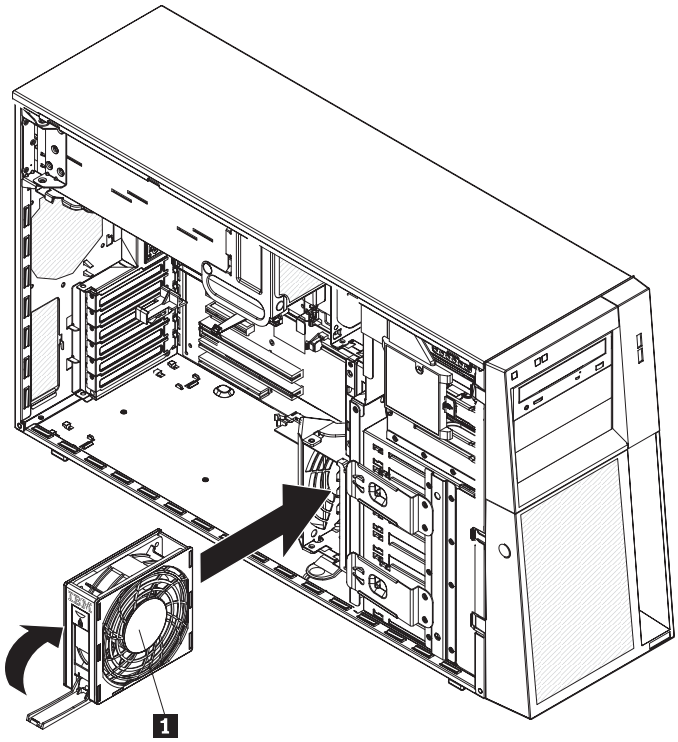
1. Review the safety information that begins on page v and “Installation guidelines” on page 20.

   Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.
2. Remove the side cover (see “Removing the side cover” on page 25).

   Attention: To ensure proper system cooling, do not leave the cover off the server for more than 2 minutes.
3. Take your finger and slide the orange release tab in the direction indicated by the arrow on top of the fan to unlock the fan-locking handle. Grasp the fan handle **1** and pull the fan out of the fan cage assembly.



4. If you are instructed to return the hot-swap fan to Lenovo, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
5. Touch the static-protective package that contains the hot-swap fan to any unpainted metal surface on the server; then, remove the fan from the package and place it on a static-protective surface.
6. Align the fan **1** over the fan slot.



7. Lower the fan into the slot and press down on the fan until it locks into place; then close the handle to the locked position.
8. Install the side cover (see “Reinstalling the side cover” on page 57).

If you have other options to install or remove, do so now; otherwise go to “Completing the installation” on page 55.

Installing the ServeRAID 8k-l adapter (TD100 models)

The IBM ServeRAID 8k-l adapter must be installed in its dedicated connector on the system board. See the illustration in the following procedure for the location of the connector on the system board. The ServeRAID 8k-l adapter is not cabled to the system board and no rerouting of the SCSI cable is required.

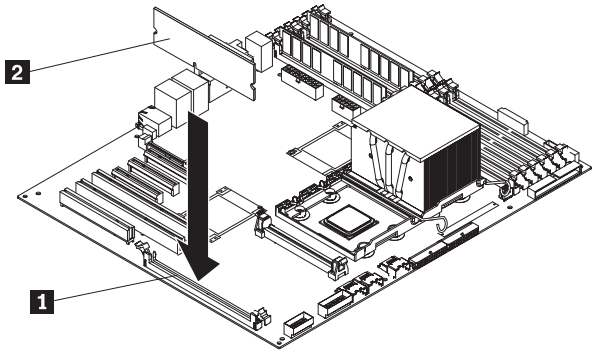
To install the ServeRAID 8k-l adapter, complete the following steps:

1. Read the safety information beginning on page v, and “Installation guidelines” on page 20.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see “Removing the side cover” on page 25.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID 8k-l adapter connector **1**, open and close the clips gently.
3. Open the retaining clip on each end of the ServeRAID 8k-l adapter connector.

4. Touch the static-protective package containing the ServeRAID 8k-l adapter to any unpainted metal surface on the server. Then, remove the ServeRAID 8k-l adapter from the package.
5. Turn the ServeRAID 8k-l adapter **2** so that the ServeRAID 8k-l adapter keys align correctly with the connector.

   Attention: Incomplete insertion might cause damage to the system board or the ServeRAID 8k-l adapter.



6. Press the ServeRAID 8k-l adapter firmly into the connector.
7. If you have other options to install or remove, do so now.
8. Replace the side cover (see “Reinstalling the side cover” on page 57). Go to “Completing the installation” on page 55.

Installing the ServeRAID-8k adapter (TD100x models)

The optional ServeRAID-8k adapter can be installed only in its dedicated connector on the system board. See the following illustration for the location of the connector on the system board. The ServeRAID-8k adapter is not cabled to the system board, and no rerouting of the SAS or SATA cable is required on many models. However, if you install this optional ServeRAID-8k adapter in simple-swap SATA models, some recabling is required.

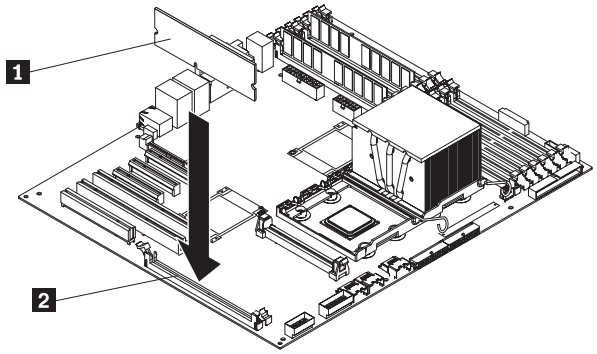
To install the ServeRAID-8k adapter, complete the following steps.

1. Read the safety information that begins on page v and “Handling static-sensitive devices” on page 22.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

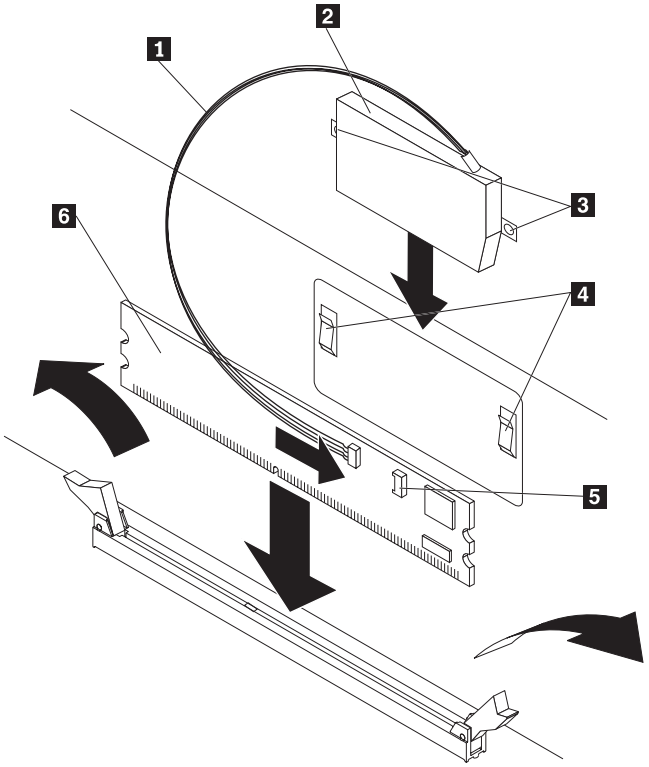
   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-8k adapter connector, open and close the clips gently.
3. Remove the side cover (see “Removing the side cover” on page 25.
4. Open the retaining clips on each end of the ServeRAID-8k adapter connector.
5. Touch the static-protective package that contains the ServeRAID-8k adapter to any unpainted metal surface on the server. Then, remove the ServeRAID-8k adapter and battery pack from the package.

6. Turn the ServeRAID-8k adapter 1 so that the ServeRAID-8k adapter keys align correctly with the connector 2 .

   Attention: Incomplete insertion might cause damage to the system board or the ServeRAID-8k adapter.



7. Press the ServeRAID-8k adapter firmly into the connector.
8. Slide the battery pack mounting tabs into the battery pack mounting clips on the chassis wall.

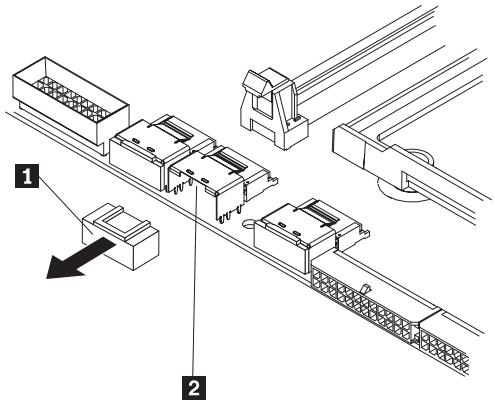


1	Battery cable	4	Battery mounting clips
2	Battery	5	Battery cable connector
3	Battery mounting tabs	6	RAID controller

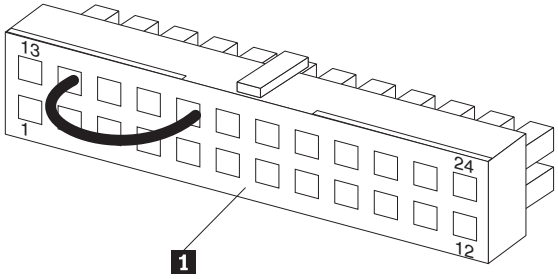
9. Plug the battery pack cable into the battery cable connector on the ServeRAID-8k adapter.

10. If you are installing the ServeRAID-8k adapter into a simple-swap SATA model, make the following cabling changes to enable RAID level-5 support:
    a. Disconnect the signal cable from the Simple-swap SATA backplate connector on the system board and connect it to the Hot-swap SAS/SATA 1 connector on the system board. See “System-board internal connectors” on page 16 for the location of these connectors on the system board.

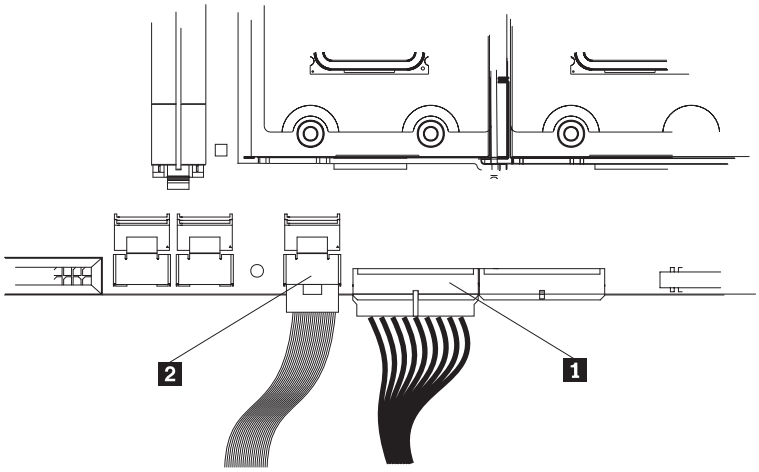
       Note: Remove the dust shield **1** (if one is present) from the Hot-swap SAS/SATA 1 signal connector **2** on the system board before installing the signal cable. Carefully grasp the dust shield and pull it out of the signal connector.



    b. Connect the RAID level-5 enabler plug (that came with the system) **1** to the SAS/SATA backplane 1 connector on the system board.

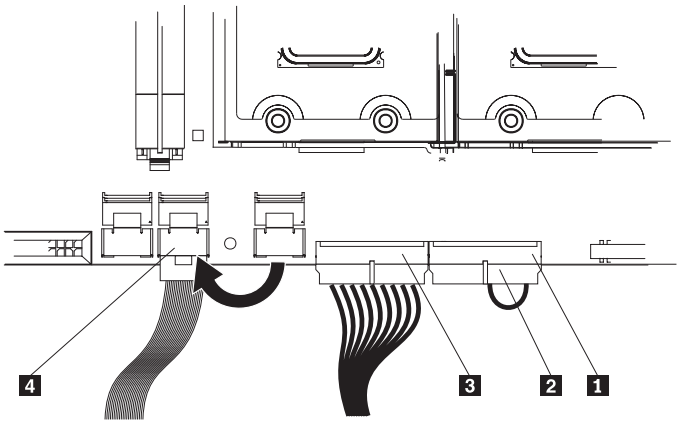


The following illustration shows how the simple-swap SATA model is cabled when it is shipped.



1 SAS/SATA backplane 2
2 Simple-swap SATA backplate

The following illustration shows how the cables must be connected when you install the ServeRAID-8k Controller into the simple-swap SATA model.



1 SAS/SATA backplane 1 connector
2 RAID level-5 enabler plug
3 SAS/SATA backplane 2 connector
4 Hot-swap SAS/SATA 1 cable

11. If you have other options to install or remove, do so now.
12. Replace the side cover (see “Reinstalling the side cover” on page 57). Go to “Completing the installation” on page 55.

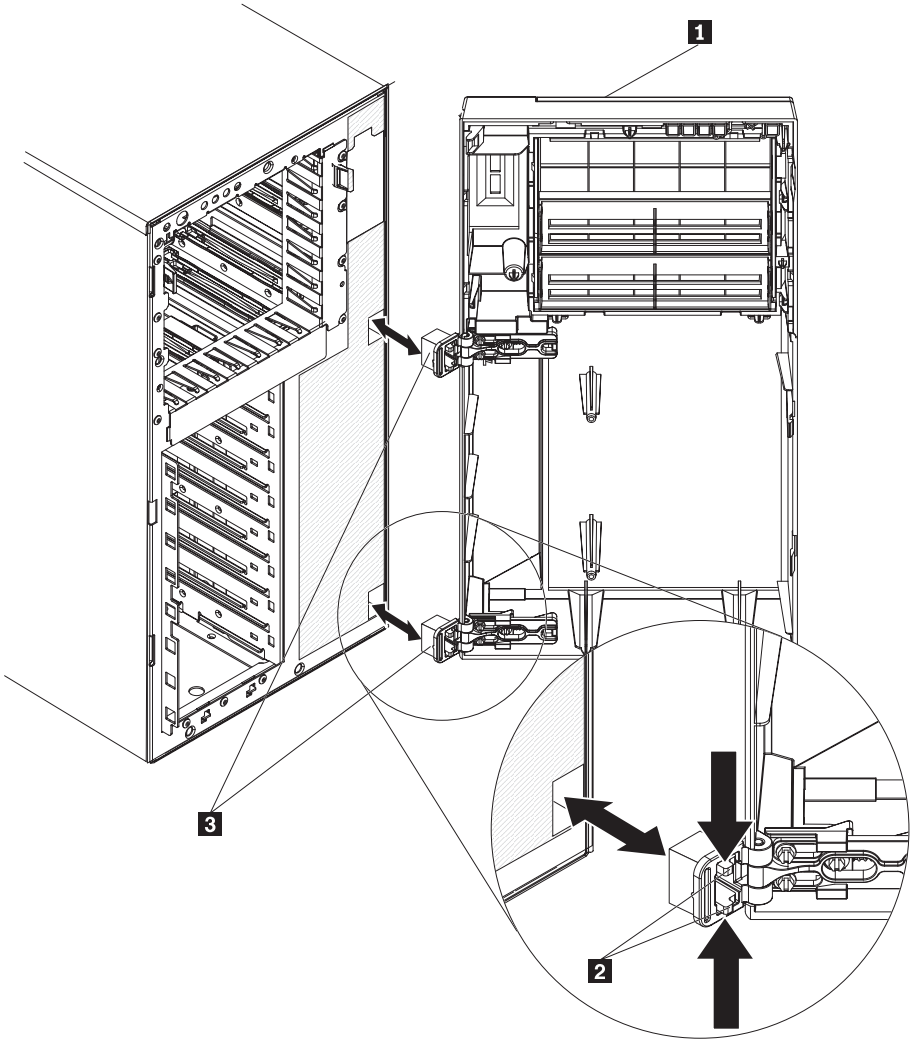
Completing the installation

To complete the installation, you must replace the bezel, reinstall the side cover, and connect all the cables and, for certain options, run the Configuration/Setup Utility program. Follow the instructions in this section.

Replacing the bezel

To replace the bezel, complete the following steps:

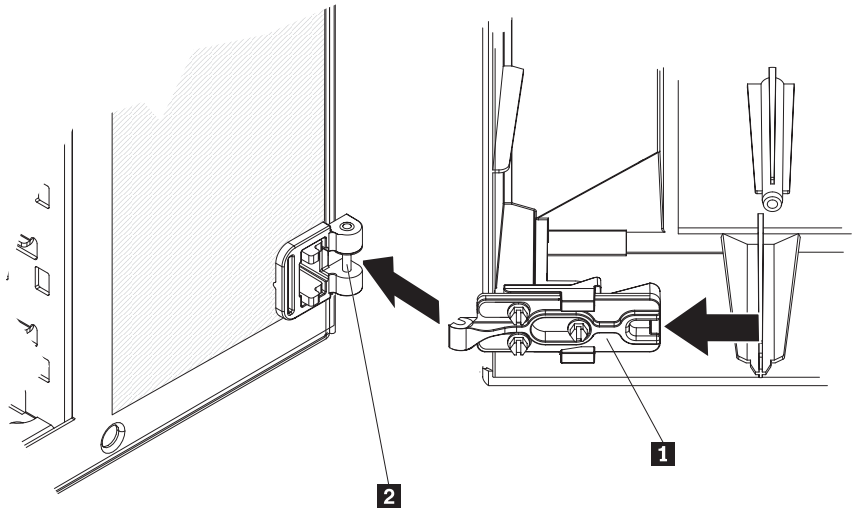
1. Align the hinge assembly with the hinge holes on the chassis.



1	Bezel
2	Retention tabs
3	Hinge assembly

2. Push the hinges into the holes on the chassis until they snap into place.
3. If however, the bezel was removed by detaching the sliding hinge mount from the hinge assembly (using the breakaway method as the bezel was designed to do), complete the following steps to reattach the bezel:

a. Press in on the rear of the sliding hinge mount **1** until it extends beyond the edge of the bezel and hold it in place.



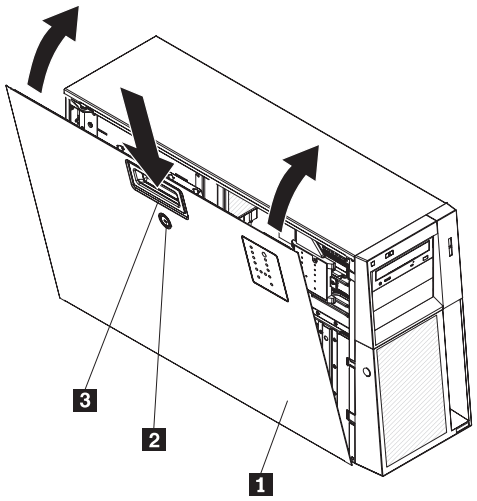
b. Align the sliding hinge mount **1** with the hinge pin **2** on the hinge assembly on the chassis.

c. Press the sliding hinge mount against the hinge pin until the sliding hinge mount snaps onto the hinge pin.

4. Close the bezel.

Reinstalling the side cover

If you removed the side cover, reinstall it.



1	Left-side cover
2	Lock
3	Cover release latch

To reinstall the side cover, complete the following steps:

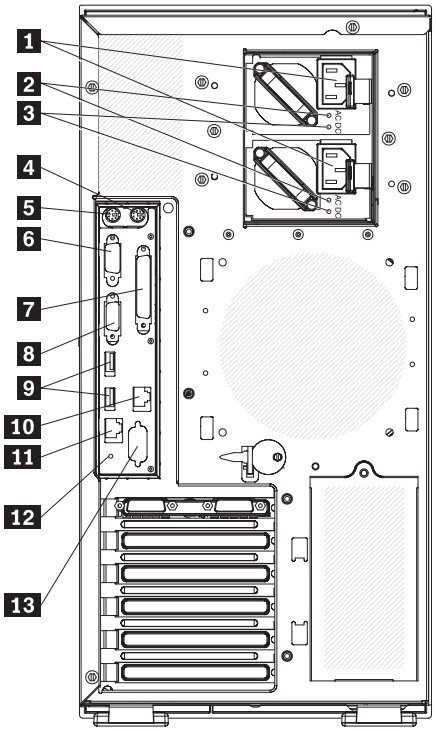
1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server. Also, make sure that all internal cables are correctly routed.
2. Insert the bottom edges of the cover into the inside of the chassis and rotate the cover toward the server.
3. Press down on the cover-release latch and close the cover to secure it in place.
4. Lock the side cover.

Connecting the cables

Attention: To prevent damage to equipment, connect the power cords last.

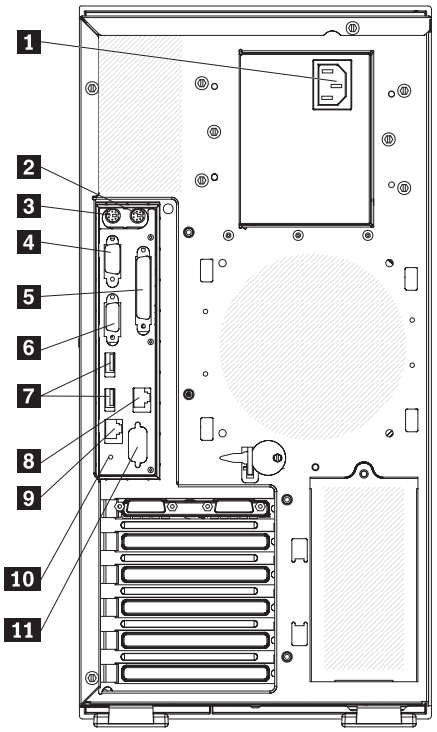
If the server cables and connector panel have color-coded connections, match the color of the cable end with the color of the connector. For example, match a blue cable end with a blue panel connector, a red cable end with a red connector, and so on.

The following illustration shows the input/output (I/O) connectors on the rear of the hot-swap power supply models with optional redundant power.



1	Power cord connectors	8	Video connector
2	AC power LEDs	9	USB connectors 3 and 4
3	DC power LEDs	10	(RJ45) Ethernet 10/100/1000 connector
4	Mouse connector	11	(RJ45) Ethernet 10/100 (for Remote Supervisor Adapter II SlimLine) connector
5	Keyboard connector	12	NMI button
6	Serial 1 (COM 1) connector	13	Serial 2 (COM 2) connector
7	Parallel connector		

The following illustration shows the input/output (I/O) connectors on the rear of the non-hot-swap power supply models.



1	Power cord connectors	7	USB connectors 3 and 4
2	Mouse connector	8	(RJ45) Ethernet 10/100/1000 connector
3	Keyboard connector	9	(RJ45) Ethernet 10/100 (for Remote Supervisor Adapter II SlimLine) connector
4	Serial 1 (COM 1) connector	10	NMI button
5	Parallel connector	11	Serial 2 (COM 2) connector
6	Video connector		

Updating the server configuration

When you start the server for the first time after you add or remove an internal option or an external device, you might receive a message that the configuration has changed. The Configuration/Setup Utility program starts automatically so that you can save the new configuration settings. For additional information, see “Using the Configuration/Setup Utility program” on page 61.

Some options have device drivers that you must install. For information about installing device drivers, see the documentation that comes with each option.

If the server has a RAID adapter and you have installed or removed a hard disk drive, see the documentation that comes with the adapter for information about reconfiguring the disk arrays.

Connecting external devices

If you install a supported optional adapter, you can attach external devices to the server.

To attach an external device, complete the following steps:

1. Read the safety information that begins on page v, “Installation guidelines” on page 20, and the documentation that comes with the device.
2. Turn off the server and all attached devices.
3. Follow the instructions that come with the device to prepare it for installation and to connect it to the server.

Note: If you are attaching an external device, see the documentation that comes with the device for information about cabling.

Installing the server in a rack

To convert the server from a tower model to a rack model, you must use a Tower-to-Rack Kit. You can then install the server in a rack cabinet. To order a Tower-to-Rack Kit for the server, contact your Lenovo marketing representative or authorized reseller.

Chapter 3. Configuring the server

Lenovo provides a number of programs to assist you with getting your server up and running quickly:

- **ThinkServer EasyStartup program**

  This program simplifies the process of installing the operating system and device drivers. It is on the *ThinkServer EasyStartup* DVD provided with your server. For details, see the *Installation Guide*.

- **Configuration/Setup Utility program**

  This program enables you to configure hardware settings and preferences in the BIOS. For details, see “Using the Configuration/Setup Utility program” on page 61.

- **Boot Menu program**

  The Boot Menu program is part of the BIOS code. Use it to override the startup sequence that is set in the Configuration/Setup Utility program and temporarily assign a device to be first in the startup sequence. For information about using this program, see “Using the Boot Menu program” on page 66.

- **Broadcom NetXtreme Gigabit Ethernet controller configuration**

  To configure the integrated Gigabit Ethernet controller, see “Configuring the Broadcom NetXtreme Gigabit Ethernet controller” on page 66.

- **Remote Supervisor Adapter II SlimLine configuration**

  For information about setting up and cabling a Remote Supervisor Adapter II SlimLine for use in an Advanced System Management (ASM) network, see the documentation that came with the optional device.

- **ThinkServer EasyManage products**

  ThinkServer EasyManage Core Server and ThinkServer EasyManage Agent work together to provide centralized hardware and software inventory management and secure, automated system management through a single console. For more information about the EasyManage products, see the *Installation Guide*.

- **Integrated System Management Firmware Update (TD100x only)**

  Use this utility program to update the firmware for the integrated system management microprocessor.

Using the Configuration/Setup Utility program

This section provides instructions for starting the Configuration/Setup Utility program and descriptions of the menu choices that are available.

Starting the Configuration/Setup Utility program

To start the Configuration/Setup Utility program, complete the following steps:

1. Turn on the server. If the server is already on when you start this procedure, you must shut down the operating system, turn off the server, wait a few seconds until all in-use LEDs are turned off, and restart the server.
2. When the message `Press F1 for Configuration/Setup, Press F12 for Boot Menu` is displayed, press F1. (This prompt is displayed on the screen for only a few seconds. You must press F1 quickly.) If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Configuration/Setup Utility menu. If you do not type the administrator password, a limited Configuration/Setup Utility menu is available.

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3. Follow the instructions on the screen.

Configuration/Setup Utility menu choices

The following choices are on the Configuration/Setup Utility main menu. Depending on the version of the BIOS code, some menu choices might differ slightly from these descriptions.

Note: When you use the server for the first time, you might want to use the Configuration/Setup Utility menu choice **Load Default Settings** to reset the Configuration/Setup Utility menu choices to the factory default settings, in case they were changed before you received the server. Otherwise, some choices might not be displayed in the menu.

- **System Summary**

  Select this choice to view configuration information, including the amount of installed memory. When you make configuration changes through other choices in the Configuration/Setup Utility program, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

  This choice is on the full and limited Configuration/Setup Utility menu.

  – **Processor Summary**

    Select this choice to view the processor information, including the type, speed, and cache size of the microprocessor.

- **System Information**

  Select this choice to view information about the server. When you make changes through other choices in the Configuration/Setup Utility program, some of those changes are reflected in the system information; you cannot change settings directly in the system information.

  This choice is on the full Configuration/Setup Utility menu only.

- **Devices and I/O Ports**

  Select this choice to view or change device assignments and input/output (I/O) ports. Select this choice to enable or disable the integrated SAS/SATA controller and Ethernet controller, and standard connectors (such as serial and parallel). **Enable** is the default setting for all controllers. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device). If you disable the SAS/SATA controller and no SAS/SATA adapter is installed, the server will have no SAS/SATA capability. If you disable the integrated Ethernet controller and no Ethernet adapter is installed, the server will have no Ethernet capability.

  This choice is on the full Configuration/Setup Utility menu only.

  – **Serial Port 1**

    Select this choice to set up serial port 1.

  – **Serial Port 2**

    Select this choice to set up serial port 2.

  – **Parallel Port Setup**

    Select this choice to set up the parallel port and to adjust the parallel port resources and features.

  – **Remote Console Redirection**

    Select this choice to enable and configure serial remote video and keyboard redirection.

  – **Internal Floppy Support**

    Select this choice to disable or enable the diskette drive.

- **SATA Programming Interface**

  Select this choice to disable, enable, or configure the Serial ATA.

  To comply with the 4690 OS requirement, this option provides a **Legacy Only (4690)** mode that you can select from the menu. When you select the **Legacy Only (4690)** mode, this enables the SATA 0 through SATA 3 ports for the 4690 OS.

- **Planar Ethernet**

  Select this choice to disable or enable the Ethernet controller on the system board.

- **USB Support**

  Select this choice to enable or disable the USB support.

- **Video**

  Select this choice to view the video information.

- **System MAC Addresses**

  Select this choice to view the MAC addresses for network devices that are installed in the server.

- **Date and Time**

  Select this choice to set the date and time in the server, in 24-hour format (*hour*:*minute*:*second*).

  This choice is on the full Configuration/Setup Utility menu only.

- **System Security**

  Select this choice to set passwords. See “Using passwords” on page 66 for more information about passwords.

  - **Administrator Password**

    This choice is on the full Configuration/Setup Utility menu only.

    Select this choice to set or change an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Configuration/Setup Utility menu. If an administrator password is set, the full Configuration/Setup Utility menu is available only if you type the administrator password at the password prompt.

  - **Power-on Password**

    Select this choice to set, change, or delete a power-on password.

- **Start Options**

  Select this choice to view or change the start options. Changes in the start options take effect when you restart the server.

  You can enable or disable the hard disk drive self-monitoring, analysis, and reporting technology (SMART) function.

  You can set keyboard operating characteristics, such as the keyboard speed, and you can specify whether the server starts with the keyboard number lock on or off.

  You can enable a virus-detecting test that checks for changes in the boot record when the server starts.

  - **Startup Sequence Options**

    Select this choice to view the **Startup Sequence Options** menu. The startup sequence specifies the order in which the server checks devices to find a boot record. The server starts from the first boot record that it finds.

- **Advanced Setup**

  Select this choice to change values for advanced hardware features, such as CPU options and PCI configuration.

Important: The server might malfunction if these settings are incorrectly configured. Follow the instructions on the screen carefully.

This choice is on the full Configuration/Setup Utility menu only.

– **CPU Options**

  Select this choice to view or change the options that control the behavior of the microprocessor.

– **PCI Bus Control**

  Select this choice to view or change the system resources that are used by the installed PCI or PCI-Express devices.

– **RSA II Settings**

  This choice is displayed only when a Remote Supervisor Adapter II SlimLine is installed in the server.

  Select this choice to view the DHCP IP address and settings and the Remote Supervisor Adapter II SlimLine MAC address; to view or change the DHCP control, static IP address, operating-system USB selections; and to save the values and reboot the Remote Supervisor Adapter II SlimLine.

– **Baseboard Management Controller (BMC) Setting**

  Select this choice to change the Intelligent Platform Management Interface (IPMI) settings for the mini-BMC controller.

  - **IPMI Specification Version**

    This nonselectable item displays the IPMI specification version.

  - **BMC Firmware Version**

    This nonselectable item displays the mini-BMC firmware version.

  - **BMC Build Date**

    This nonselectable item displays the date that the mini-BMC code was built.

  - **BMC Build Level**

    This nonselectable item displays the version of the mini-BMC code.

  - **Existing Event Log number**

    This nonselectable item displays the number of entries in the system-event log.

  - **BMC POST Watchdog**

    This option enables or disables the POST watchdog. **Disabled** is the default setting.

  - **BMC POST Watchdog Timeout**

    This option enables or disables the mini-BMC POST watchdog timer.

  - **System - BMC Serial Port Sharing**

    Select this choice to specify whether the serial port that the mini-BMC uses is shared with the other system components or is dedicated to the mini-BMC. When this option is enabled, the mini-BMC controls the serial port by way of remote commands. If this option is disabled, the serial port is assigned to the mini-BMC, unless the **BMC Serial Port Access Mode** option is disabled.

  - **BMC Serial Port Access Mode**

    Select this choice to set the mini-BMC access mode for the system serial port. **Shared** is the default setting. You can choose from the following access modes:

Shared

The serial port is available for use by POST and the operating system; however, the mini-BMC can still monitor the serial data for a take-control sequence.

Pre-Boot

The mini-BMC has control of the serial port before the operating system is booted; however, after the operating system is booted, the mini-BMC will not have access to the serial port until you turn off the server or reset the settings.

Dedicated

The mini-BMC has complete control of the serial port. POST and the operating system will not be allowed to use the serial port.

Disabled

The mini-BMC has access to the serial port.

- **Reboot System on NMI**

  This option sets the mini-BMC timer to automatically reboot the server after a non-maskable interrupt (NMI) occurs. **Enabled** is the default setting.

- **User Account Settings**

  Select this choice to view the user account settings for the mini-BMC.

- **BMC Network Configuration**

  Select this choice to configure specific network settings for the mini-BMC.

- **BMC System Event Log**

  Select this choice to view the mini-BMC system-event log, which contains all system-error messages that have been generated. Use the arrow keys to move among pages in the log. Run the diagnostic programs to get more information about the error codes. See the *Hardware Maintenance Manual* on the *ThinkServer Documentation* DVD for instructions for solving the problems. Select **Clear BMC System Event Log** to clear the mini-BMC system-event logs.

- **Event/Error Logs**

  Select this choice to view or clear error logs.

  – **System Event/Error Log**

    Select this choice to view the system-event and error messages that the system generated during POST and run time by the SMI handler and by the service processor. The most recent event or error is displayed first. Use the Down Arrow key to view the older entries, and use the Up Arrow key to view the newer entries. Select **Clear system logs** and press Enter to erase the system event/error log.

- **Save Settings**

  Select this choice to save the changes that you have made in the settings.

- **Restore Settings**

  Select this choice to cancel the changes that you have made in the settings and restore the previous settings.

- **Load Default Settings**

  Select this choice to cancel the changes that you have made in the settings and restore the factory settings.

- **Exit Setup**

Select this choice to exit from the Configuration/Setup Utility program. If you have not saved the changes that you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

Using passwords

You can use any combination of up to seven characters (A - Z, a - z, and 0 - 9) for the power-on (user) password or the administrator password.

If you set both a power-on password and an administrator password, you can type either password at the password prompt that is displayed as you start the server. However, if you want to change the settings in the Configuration/Setup Utility program, you must type the administrator password to access the full Configuration/Setup Utility menu. If you type the power-on password, you have access to only the limited Configuration/Setup Utility menu.

Keep a record of the passwords in a secure place. If you forget the power-on password or administrator password, you can regain access to the server through one of the following methods:

- If you have forgotten the power-on password and an administrator password is set, type the administrator password at the power-on password prompt. Start the Configuration/Setup Utility program and change the power-on password.
- Remove the battery and then install the battery.

Using the Boot Menu program

The Boot Menu program is a built in, menu-driven configuration program that you can use to temporarily redefine the first startup device without changing settings in the Configuration/Setup Utility program.

To use the Boot Menu program, complete the following steps:

1. Restart the server.
2. Press F12.
3. Select the startup device.

The next time the server is started, it returns to the startup sequence that is set in the Configuration/Setup Utility program.

Configuring the Broadcom NetXtreme Gigabit Ethernet controller

The Ethernet controller is integrated on the system board. It provides an interface for connecting to a 10 Mbps, 100 Mbps, or 1 Gbps network and provides full duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet port in the server supports auto-negotiation, the controller detects the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operates at that rate and mode.

You do not have to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller. For device drivers and information about configuring the Ethernet controller, see the *Broadcom NetXtreme Gigabit Ethernet Software* CD that comes with the server. To find updated information about configuring the controller, complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TD100 and TD100x**, and click **Continue**.
4. Click **User's guides and manuals** for documentation.

Using the baseboard management controller

The mini-baseboard management controller provides basic environmental monitoring for the server. If environmental conditions exceed thresholds or if system components fail, the baseboard management controller lights LEDs to help you diagnose the problem and also records the error in the BMC system-event log.

Important: If the system-error LED on the front of the server is lit but there are no other error indications or you have corrected all errors, restart the server. If the LED continues to remain lit after you restart the server, power off the server; then, turn the server on again.

Using the baseboard management controller utility programs

Use the baseboard management controller utility programs to configure the baseboard management controller, download firmware updates and SDR/FRU updates, and remotely manage a network.

Using the baseboard management controller configuration utility program

Use the baseboard management controller configuration utility program to view or change the baseboard management controller configuration settings. You can also use the utility program to save the configuration to a file for use on multiple servers.

Go to http://www.lenovo.com/support/ to download the utility program. Run the utility program to create a configuration utility diskette.

Complete the following steps to start the baseboard management controller configuration utility program:

1. Insert the configuration utility diskette into the diskette drive and restart the server.
2. From a command-line prompt, type `bmc_cfg` and press Enter.
3. Follow the instructions on the screen.

Using the baseboard management controller firmware update utility program

Use the baseboard management controller firmware update utility program to download a baseboard management controller firmware update or a SDR/FRU update. The firmware update utility program updates the baseboard management controller firmware or SDR/FRU data only and does not affect any device drivers.

Important: To ensure proper server operation, be sure to update the server baseboard management controller firmware before you update the BIOS code.

To download the program, complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TD100 and TD100x**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.
5. From the BMC software, copy the files bmc.exe and Init.ini to a setup utility diskette.

To update the firmware, run the executable program in the package. Follow the instructions that come with the package.

Appendix. Notices

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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

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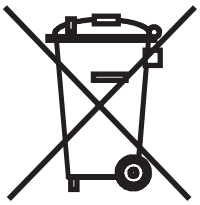

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EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE and minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances. For additional WEEE information, go to: http://www.lenovo.com/lenovo/environment.

Recycling statements for Japan

日本のリサイクルに関して

本機器またはモニターの回収リサイクルについて

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http://www.ibm.com/jp/pc/service/recycle/pcrecycle

また、同法により、家庭で使用済みとなったパソコンのメーカー等による回収再資源化が2003 年10 月1 日よりスタートしました。詳細については、以下のURL にアクセスしてください。
http://www.ibm.com/jp/pc/service/recycle/personal

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本機器のプリント基板等には微量の重金属(鉛など) が使用されています。使用後は適切な処理を行うため、上記「本機器またはモニターの回収リサイクルについて」に従って廃棄してください。

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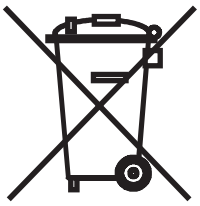
Battery return program

This product may contain a lithium or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal or batteries outside the United States, go to http://www.lenovo.com/lenovo/environment or contact your local waste disposal facility.

For Taiwan: Please recycle batteries.

For the European Union:



Notice: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueue dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury, and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence

of hazardous substances. For proper collection and treatment, go to http://www.lenovo.com/lenovo/environment.

For California:

Perchlorate material - special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

German Ordinance for Work gloss statement

The product is not suitable for use with visual display work place devices according to clause 2 of the German Ordinance for Work with Visual Display Units.

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der Bildschirmarbeitsverordnung geeignet.

Electronic emissions notices

The following section includes statements about electronic emissions.

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Lenovo is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Lenovo cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-Lenovo option cards

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

German Class A compliance statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

Deutschland:

Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmittein

Dieses Produkt entspricht dem “Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln” EMVG (früher “Gesetz über die elektromagnetische

Verträglichkeit von Geräten"). Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EG Richtlinie 2004/108/EC (früher 89/336/EWG), für Geräte der Klasse A.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die Lenovo (Deutschland) GmbH, Gropiusplatz 10, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

Nach der EN 55022: "Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen."

Nach dem EMVG: "Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind." (Auszug aus dem EMVG, Paragraph 3, Abs. 4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Anmerkung: Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den Handbüchern angegeben, zu installieren und zu betreiben.

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Taiwanese Class A warning statement

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

Lenovo product service information for Taiwan

台灣 Lenovo 產品服務資訊如下：
荷蘭商聯想股份有限公司台灣分公司
台北市信義區信義路五段七號十九樓之一
服務電話：0800-000-700

Chinese Class A warning statement

声　　明

此为 A 级产品，在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Korean Class A warning statement

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자
또는 사용자는 이점을 주의하시기 바라며, 만약 잘못 판매 또는
구입하였을 때에는 가정용으로 교환하시기 바랍니다.

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